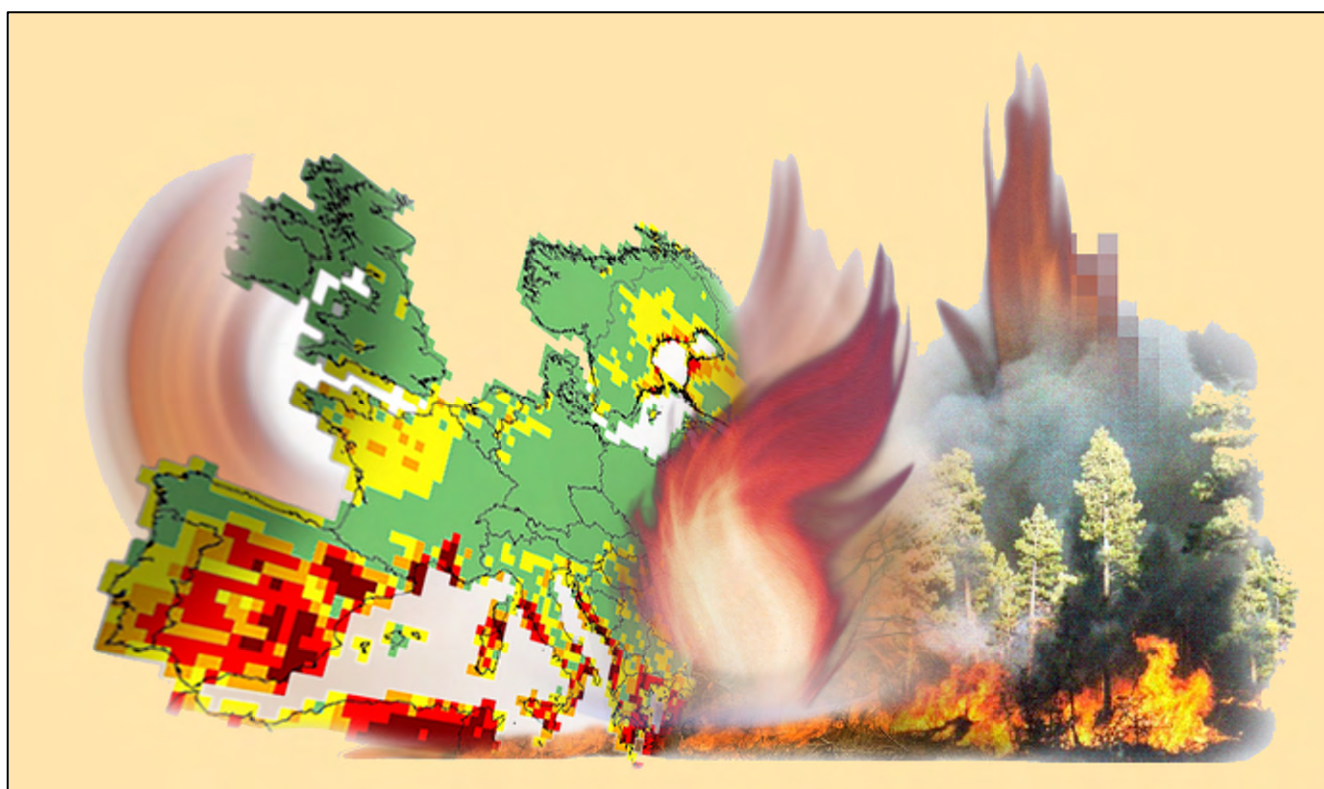


Report No 10

# Forest Fires in Europe 2009



EUR 24502 EN - 2010



# Forest Fires in Europe 2009

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## FOREWORD

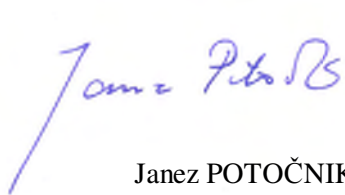
When vast areas of nature are burning as a result of human intervention and this becomes a recurrent issue, we should find ways to prevent and counteract the problem together. This is particularly true as regards protected forest areas for which so many efforts have been made by the Member States with EU support, especially to protect biodiversity-rich land.

The present report is based on the European Forest Fire Information System (EFFIS), established by the Joint Research Centre and Directorate General for Environment, which delivers all the data needed to forecast forest fires, to assess the damages caused by them and to look into the causes of fires. We are glad to contribute to the protection of our environment by further supporting the “forest fire community”. The system is an example of how Member States and the Commission work together on a purely voluntary basis and we would like to thank the competent national authorities for their active contribution.

During 2009, the Commission put forest fires higher on the political agenda, focusing more on prevention and adapting our forests to challenges resulting from climate change. In these fields, preparatory work on two Council conclusions was done, the Commission adopted the Green Paper on forest protection and information and the European Parliament took initiatives in forest fire prevention. We also recognize and appreciate the active involvement of the Member States and hope that further common ground can be found to safeguard European forests which are an essential element of our cultural heritage.

The Commission increased its contribution and supported the setting-up of the EU Forest Fires Tactical Reserve (EUFFTR), which aims at stepping up Member States cooperation. In 2009, the EUFFTR pilot project consisted of two fire-fighting planes (Canadair CL-215) that were leased from the market and were available to fly 150 hours each from 1 July to 30 September. The planes were a supplementary European resource designed to reinforce the overall EU fire-fighting capacity. The EUFFTR intervened in 6 activations: twice in France-Corsica and Portugal, once in Italy-Sardinia, and once in Greece. In some cases assistance was also provided bilaterally (e.g. Spain and Portugal assisted each other several times last summer). In 2009, the summer's major intervention was in Greece where the EUFFTR intervened together with aircraft from France, Italy, Cyprus and Turkey. Furthermore, the Monitoring and Information Centre of the European Commission pro-actively monitored the forest fire situation.

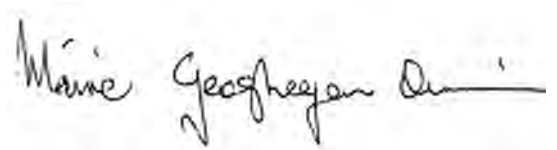
We reaffirm the Commission's commitment to continue working together with the European Civil Protection Mechanism's Participating States to ensure a safer Europe and we are confident that we will find ways to tackle forest fires and their consequences for people and the environment. We also invite the Member States to make good use of EU funding, in particular as regards forest fire prevention and forest restoration measures.



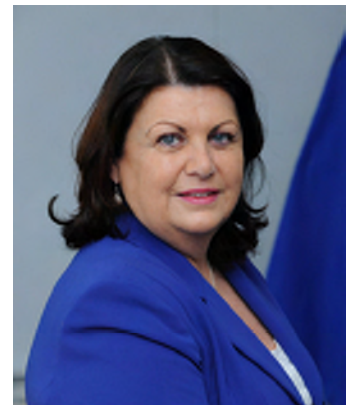
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## 1. FOREST FIRES 2009 IN THE EUROPEAN COUNTRIES

### 1.1. SOUTHERN MOST AFFECTED MEMBER STATES (1980 – 2009)

The long time series of forest fire data available for these 5 southern countries (Portugal, Spain, France, Italy, and Greece) justifies a separate analysis as has been the case in previous reports.

During 2009, fires in these 5 countries burned a total area of 323 896 hectares, which, although almost double the area burnt in 2008, is nevertheless still below the average for the last 29 years. The number of fires that occurred (52 795) is also slightly below the average of the last two decades (see Table 1 for details).

Figure 1a shows the total burnt area per year in the five Southern Member States since 1980. The statistics vary considerably from one year to the next, which clearly indicates how much the burnt area depends on seasonal meteorological conditions. Overall, the total burnt area for all 5 countries in 2009 is only 75% of the average for the last decade (Table 1).

Figure 1b shows the yearly number of fires in the five southern Member States since 1980. After the increasing trend during the 1990s, which was also partly due to the improvement in recording procedures, the number of fires was stable for around one decade, and in the last years a decrease has been observed. This trend seems to continue, but will have to be confirmed in the next years. Overall, 2009 was an average year in terms of number of fires. The total number of fires in the 5 countries was significantly greater than 2008, in particular because of a large increase in those reported from Portugal (in fact almost half the total reported fires in 2009 came from Portugal). In contrast, the number of fires in Italy was even lower than in 2008. The values from Greece were also low (although these are provisional figures and likely to rise when the final count is made).

Figure 1c shows the yearly average fire size in the 5 countries since 1980. There is a clear difference in average fire size before and after 1990. This is a similar trend to that observed in the number of fires and is also partly due to the same reasons (the additional fires that are recorded thanks to the improvements in the statistical systems are the smallest ones). But it is also largely due to the improvements of the fire protection services of the countries, which may explain why, although the total number of fires in 2009 was not far from

the long average, the total burnt area remains significantly below it.

On the other hand since the 1990s we have been observing periodically bad years followed by 1-2 positive years (Figure 1a and Figure 1b).

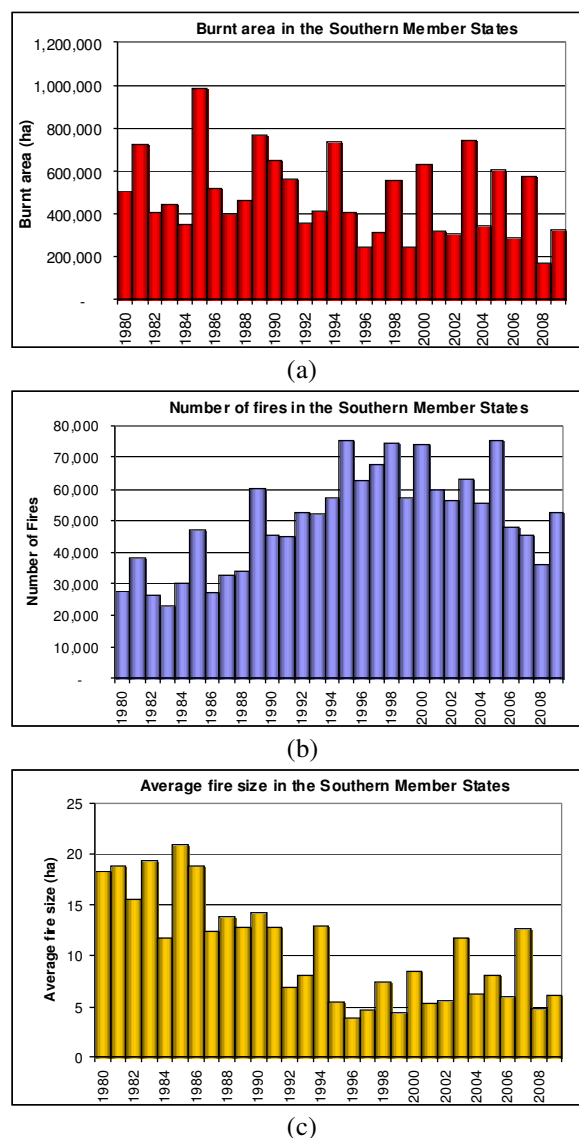


Figure 1. Burnt area (a) number of fires (b) and average fire size (c) in the five Southern Member States for the last 30 years.

Figure 2 compares the yearly averages for burnt areas, number of fires and average fire size for the periods 1980-89; 1990-99 and 2000-09 with the figures for 2009. It presents each of the 5 countries separately and also their total. This figure shows that 2009 was a reasonably good year for southern Europe as a whole. The overall figure for the five southern Member States is below the averages of previous periods for average fire size, number of fires, and, in particular, burnt area.

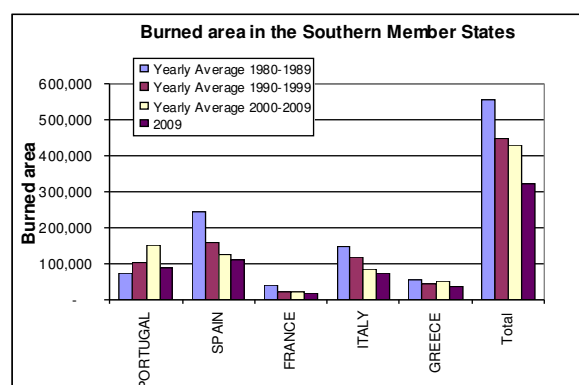
Figure 3 shows the contribution of each of the five Member State in terms of burnt areas and numbers of fires to the overall figures for all the considered Southern Member States in 2009.

Table 1 gives a summary of the burnt areas and number of fires for the last 30 years, the average for the 1980s and 1990s, and the average for the last 10 years, together with the figures for 2009.

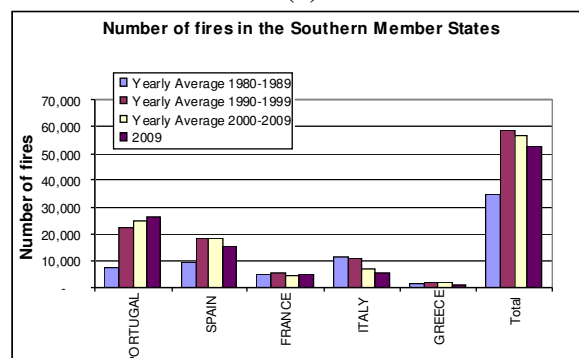
As mentioned, a total of 323 896 ha were burnt in the five southern Member States in 2009, which is below the average of the last 30 years. The number of fires in 2009 was 52 795, which is below the average of the last 20 years.

Since the area of each country is different, and the area at risk within each country is also different, the comparisons among countries cannot be absolute. During 2009 Portugal had a slightly higher share of the fires than usual, while Italy had relatively fewer. However, the relative proportions of burnt areas are very close to the long term averages, implying that the average fire size in Portugal was slightly lower in 2009 (i.e. many of the extra reported fires were small ones), while some very large fires on Sardinia influenced the statistics of Italy.

Over the last decade, the previous tendency up to the mid-1990s of the five southern Member States towards an increase in the number of fires seems to be stabilized and some decrease has been observed. This may possibly be due to the positive effect of the public information campaigns carried out in all the countries and the improvements in the prevention and fire-fighting capacities. It remains to be seen whether these improvements can be continued as the next decade starts.



(a)



(b)

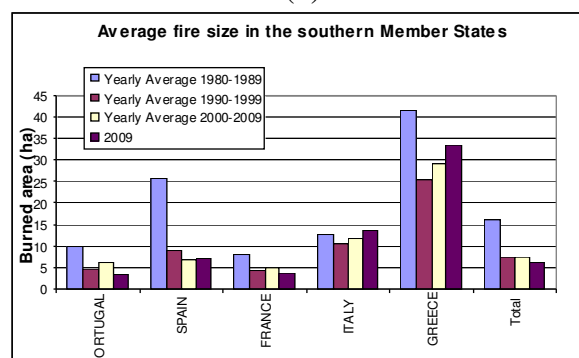


Figure 2. Burnt areas (a), number of fires (b) and average fire size (c) in the five Southern Member States in the year 2009 as compared with average values for previous decades.



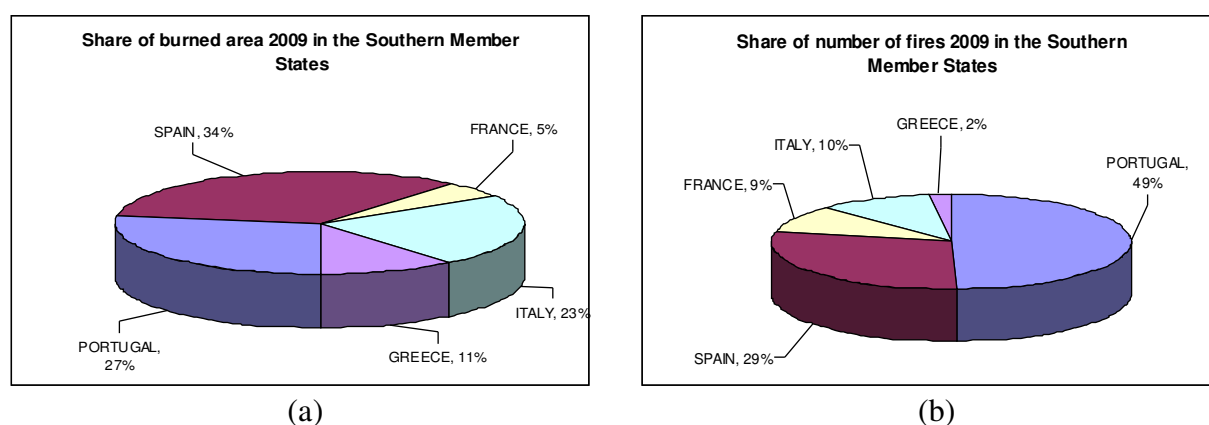


Figure 3. Share of the total burnt area (a) and the total number of fires (b) in each of the Southern Member State for 2009.

Table 1. Number of fires and burnt area in the five Southern Member States in the last 30 years.

Number of fires	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE <sup>(*)</sup>	TOTAL
2009	26 119	15 391	4 800	5 422	1 063	52 795
% of total in 2009	49%	29%	9%	10%	2%	100%
Average 1980-1989	7 381	9 515	4 910	11 575	1 264	34 645
Average 1990-1999	22 250	18 152	5 538	11 164	1 748	58 851
Average 2000-2009	24 949	18 337	4 406	7 259	1 569	56 645
Average 1980-2009	18 194	15 335	4 951	9 999	1 569	50 047
TOTAL (1980-2009)	545 805	452 848	148 531	299 977	47 058	1 501 409

Burnt areas (ha)	PORTUGAL	SPAIN	FRANCE	ITALY	GREECE <sup>(*)</sup>	TOTAL
2009	87 416	110 783	17 000	73 355	35 342	323 896
% of total in 2009	27%	34%	5%	23%	11%	100%
Average 1980-1989	73 484	244 788	39 157	147 150	52 417	556 995
Average 1990-1999	102 203	161 319	22 735	118 573	44 108	448 938
Average 2000-2009	150 101	125 239	22 342	83 878	49 238	430 798
Average 1980-2009	108 956	177 115	28 078	116 534	48 587	478 910
TOTAL (1980-2009)	3 257 886	5 313 457	842 332	3 496 005	1 457 624	14 367 304

<sup>(\*)</sup> Provisional data for 2009.

### 1.1.1. Portugal

#### *Fire danger in the 2009 fire season*

In 2009, burnt area has increased up to 87 416.27 ha, about 5 times the area burnt in the previous year. However, it represents 59% of the average of the previous decennium, which was 148 452 ha. Regarding forest fires numbers, there was also an increase in 2009, especially small fires under 1 ha, in a total of 26 119 fires. This value represents an increase of 5% when compared to the average of fire numbers of the last decennium and an increase of 40% in relation to 2008.

In spite of the increased burned area and number of fires, Portugal was able to meet the targets set on the National Fire Plan<sup>1</sup>, in what regards the total burnt area per year. This was the fourth year accomplishing the target of 100 000 ha annual burned area by 2012, established by the National Fire Plan (2006).

These outcomes had high impact mostly on shrubland, 62%, rather than woodland, 38%.

According to the information provided by the National Meteorological Institute, the meteorological daily severity index (DSR), derived from the Fire Weather Index, shows the evolution of the fire risk in an operational perspective for the year 2009 (Figure 4).

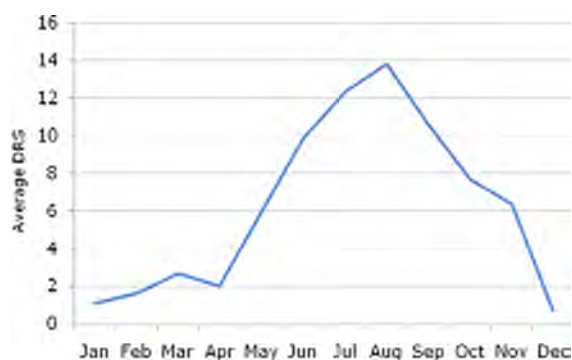


Figure 4. DSR variation in 2009

<sup>1</sup> Portugal is facing a trend of decrease in the annual burnt area records since 2005, when the Government, after the fire season settled a reform on the national system for forest fire prevention and suppression, including the adoption of the National Fire Plan in May 2006, with the goal of 100 000 ha burnt/annually by 2012.

#### *Fire occurrence and affected surfaces*

The year of 2009 inverted the decreasing trend in the number of fire occurrence and burned areas observed since 2006. Portugal registered a total number of 26 119 forest fires (78% < 1ha), responsible for the burning of 87 416.27 ha (Figure 5 and Table 2). Forest fires affected mainly shrubland (68.3%). *Eucalyptus globulus* plantations, *Quercus* sp. and *Pinus pinaster* stands were the forest covers most affected by fires.

Between January and June 8 852 forest fires occurred (34% total forest fires), which consumed approximately 19 755.73 ha (23% total burned area).

In the summer period (July-September, corresponding to the most critical period of forest fires) were reported 58% of the occurrences that burned about 62 972.57 ha (72% total burned area). The most critical forest fires occurred between August and mid-September.

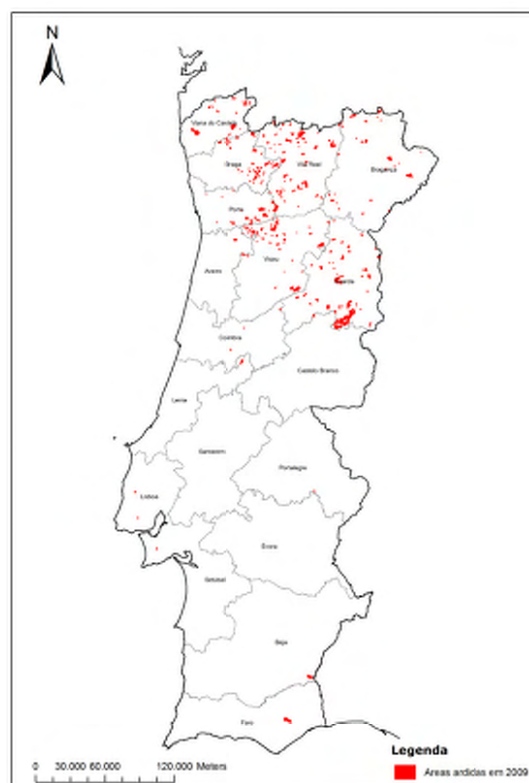


Figure 5. Burned areas in 2009, provisory data (Portugal).

Source: ISA-DEF (2009); AFN (2009)

Table 2. Forest fires in Portugal (monthly distribution)

Month	Number of Fires	Burnt Area (ha)		
		Wooded land	Shrub land	Total
Jan	31	11	23	34
Feb	1 169	304	1 871	2 175
Mar	3 758	3 805	9 843	13 648
Apr	1 199	422	1 124	1 546
May	1 413	929	788	1 717
Jun	1 282	325	310	635
Jul	2 152	1 039	2 772	3 811
Aug	5 135	10 017	23 156	33 173
Sep	7 774	6 449	19 540	25 989
Oct	2 070	789	3 785	4 574
Nov	89	2	90	92
Dec	47	5	17	22
<b>TOTAL</b>	<b>26 119</b>	<b>24 097</b>	<b>63 319</b>	<b>87 416</b>

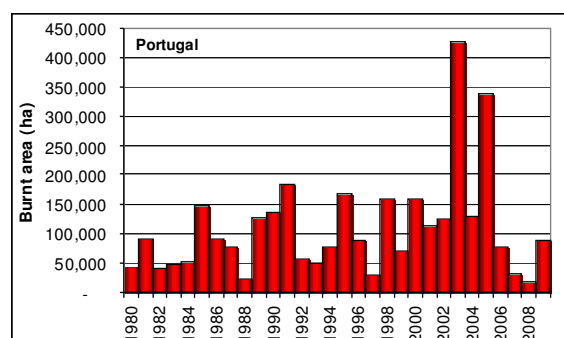
Fire occurrence (Table 3) prevailed mostly in the urban districts, such as Porto, Braga, Bragança, Viana do Castelo, Viseu (Northern region) and Aveiro, Guarda (Center Region), which registered 71% of the total number of fires (mainly very small fires). The Northern and Central regions of Portugal were the most affected by forest fires (83 393.33 ha - 95% of the total). In these regions are concentrated large areas of Eucalyptus and Pine stands and mountainous areas where the usage of fire for pasture renewal still has a strong prevalence.

Table 3. Number of fires and burned area in Portugal (NUTSII - 2009).

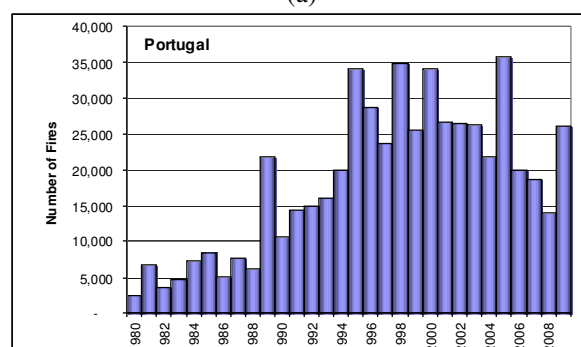
NUTS II Region	Number of fires			Burned Area (ha)		
	≥ 1ha	< 1ha	Total	Shrub land	Wooded land	Total
Norte	4 432	13 719	18 151	44 567	14 726	59 294
Centro	1 009	3 451	4 460	15 937	8 163	24 100
Lisboa	312	2 275	2 587	751	491	1 242
Alentejo	57	264	321	702	338	1 039
Algarve	51	549	600	1 362	379	1 741
<b>TOTAL</b>	<b>5 861</b>	<b>20 258</b>	<b>26 119</b>	<b>63 319</b>	<b>24 097</b>	<b>87 416</b>

The analysis of the yearly trends in the number of fires and burned areas in Portugal shows an increase in the last year in both parameters, against the trend of decrease (Figure 6).

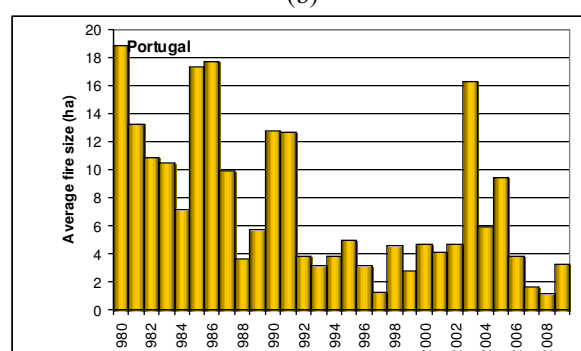
Portugal registered 134 large fires (> 100 ha), which corresponded to 63% of the total burned area. There were registered 25 fires larger than 500 ha, that burned 31 859 ha. The largest fire of 2009 occurred in Guarda district, burning 7 080 ha, on 30<sup>th</sup> August and during 3 days.



(a)



(b)



(c)

Figure 6. Burnt areas (a), number of fires (b) and average fire size (c) in Portugal for the last 30 years.

### Fire fighting means and information campaigns

For the 2009 forest fire season, the Portuguese Authorities significantly increased the number of means available for surveillance, detection and fire-fighting operations.

The distribution of these means during the year of 2009 was made in phases. The number of means applied in each phase depended, amongst other factors, on the forest fire risk expected for a given period. For example, during the most critical period, Charlie Phase (1JUL-30SEP), there were around 9 829 human resources, 2 196 vehicles and 56 aerial means available.

In order to improve and assure the fire fighting operations out of the critical period, terrestrial and

aerial means were made permanently available during the Alfa and Echo phases.

In Table 4, there is a summary of all the fire-fighting means distributed by phases:

Table 4. . Fire-fighting means available per phase

<i>Phases</i>	<i>Elements</i>	<i>Vehicles</i>	<i>Aerial Means</i>
Alfa (< 15MAY)	Means available on demand		2 - 7
Bravo (15MAY-30JUN)	6 200	1 465	24
Charlie (1JUL-30SEP)	9 829	2 196	56
Delta (1OCT-15OCT)	5 441	1 247	19
Echo (> 15OCT)	Means available on demand		2 - 7

With respect to aerial means they were of the following types:

- 35 Helis for initial attack;
- 14 Aircrafts for initial attack;
- 5 Helis for enlarged attack;
- 2 Amphibious aircrafts for enlarged attack.

All means were guaranteed by different public and private entities/organizations (11) such as the National Authority for Civil Protection, Fire Fighter Units, National Guard, National Forest Authority, Biodiversity and Environmental Conservation Institute (ICNB), Police (PSP), Army and Forest Producers Associations (AFOCELCA).

In the case of Fire Fighter Units they were responsible for the development of fire fighting operations covering all the Portugal districts (18), with a force of 4 933 fire fighters and 1 182 vehicles.

There were also a group of special teams whose activity was related mainly to surveillance, detection and initial attack actions. Their actions allowed the surveillance of suspicious activities, the early detection of forest fires and the timely development of initial attack actions. They were the Relief, Protection and Intervention Group (GIPS), the Special Fire Brigade Force (FEB) and Fire Analysis and Utilization Group (GAUF).

In the case of the GIPS, dependent on the National Guard, this force had 638 elements and 102 vehicles, distributed among 11 districts. They performed 6 407 initial attack missions (4 548

airborne and 1 859 terrestrial), as well as 7 962 terrestrial patrols.

With respect to the FEB, dependent on ANPC, it had 259 elements and 35 vehicles, distributed among 7 districts, and they had developed approximately 2 775 initial attack missions (1 706 airborne and 1 069 terrestrial).

Finally, the GAUF, dependent on AFN, with 36 experts acting all over the country, intervened on 135 occasions.

Relative to the development of initial attack actions in the scope of forest fire fighting operations, the average time registered for the arriving of the first forces to the incident area was around 7 minutes in terms of aerial means and 13 minutes for terrestrial means. It should be noted that the target time defined for this same purpose in the 2009 Operational Directive was 20 minutes.

There were other entities that had an important role in the implementation of the 2009 Operational Directive. They were the Forest Sapeurs and the Surveillance and Initial Attack Teams, dependent on the National Forest Authority and on the Biodiversity and Environmental Conservation Institute, respectively.

In the case of the Forest Sapeurs, this force had around 1 500 elements, and they performed 3 189 actions (1 112 initial attack actions, 1 007 fire fighting supporting operations and 1 070 mop up actions).

Finally, the Surveillance and Initial Attack Teams, acting mainly on environmental protecting areas, with a force of 131 elements, intervened on 879 occasions (372 initial attack actions, 287 fire fighting supporting operations and 220 mop up actions).

Besides the already described significantly increased means available for surveillance, detection and fire-fighting operations and missions developed, in terms of fire-fighting strategy, there were some other improvements during the year of 2009:

- Creation of 120 permanent intervention teams, around 600 fire fighters, distributed among 13 districts;

- Publication of operational guidelines to support the use of aerial means in civil protection operations.

### *Loss of human lives in the 2009 fire campaign.*

Forest fires in Portugal caused, during 2009, the deaths of 4 civilians. All of them were caught by fire when performing soil renewal actions.

It should be noted that all of these deaths were due to spring fires.

There was also registered the death of 3 fire fighters during a forest fire operation, due to a car accident. This situation also caused the injury of 2 fire fighters.

### *Operations of mutual assistance*

During 2009 Portugal required assistance through the EU-Mechanism for Civil Protection three times. The assistance received was in terms of aerial means and is presented in Table 5.

Table 5. Assistance received during 2009

<i>Request</i>	<i>Requested Means</i>	<i>Mission</i>	<i>Period</i>	<i>Flight Hours</i>	<i>Water Drops</i>
13AUG	2 Canadairs (EUFFTR)	Forest Fire Fighting Operations	14-20 AUG (7 days)	55 h	38
31AUG	2 Canadairs (Italy)	Forest Fire Fighting Operations	01-03 SEP (3 days)	14 h	24
05SEP	2 Canadairs (EUFFTR)	Forest Fire Fighting Operations	06-12 SEP (7 days)	82 h	142

The bilateral agreement with Spain for reinforcement of aerial means and ground fire-fighting forces in and outside the border area (15 km to each side of the border) was also activated, several times. One of these actions was the assistance provided by Portugal to Spain, in order to support the Spanish Authorities forest fire fighting operations, from the 23<sup>rd</sup> to 26<sup>th</sup> of July, involving the deployment of 1 Canadair, and its respective crew, and one Liaison Officer.

### *Fire causes*

In 2009 the National Guard proceeded with the criminal investigation of 12 176 forest fires (47% of the total of forest fires registered in 2009). Intentional fires corresponded to 28% of the determined causes and Accidents or Negligence were present in the ignition of 32% of the human-caused fires (Figure 7). Pasture renewal and agricultural burnings represented 34% of the accidents or negligence fires.

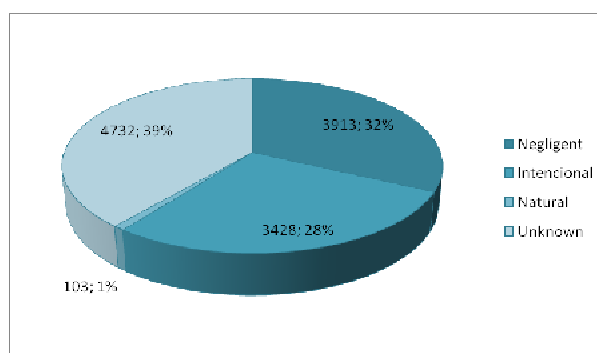


Figure 7. Main causes of forest fires in 2009

### *Policy measures*

#### *a) Decree-Law 124/2006, with the changes introduced by the Decree-Law 17/2009*

Establishes a set of preventive measures regarding forest fires prevention. In 2009, the publishing of Regulation 678/2009, established the period between 1<sup>st</sup> July and 15<sup>th</sup> October as the critical period, where special preventive measures prevailed.

#### *b) Decree-Law 16/2009*

Defines mandatory forest management plans concerning risks, namely forest fires.

#### *c) Legal Order 44/2009*

District Fire Plans were defined.

#### *d) Legal Order 14031/2009*

Regulamentation of Prescribed fire and other technical fire is published.

#### *Bilateral Commission on Forest Fires Prevention and Suppression (Portugal/Spain)*

There were no follow-up progresses in the Commission works.

### *Forest fire prevention and information campaigns*

#### **(a) Information and Public awareness campaigns**

Portugal developed a public awareness campaign for forest fires prevention under the slogan “Portugal without forest fires depends on all of us”. Under funding by the National Forest Fund, several actions were taken: for example, the national and regional awareness campaign in the media, warning about hazardous behaviours, promoted by the National Authority for Civil Protection (ANPC), National Forest Authority (AFN) and municipalities.

In the public information domain, the National Authority of Civil Protection and the National Forest Authority made significant efforts on the availability of online information. To reach that goal, AFN published online seven reports, between 8<sup>th</sup> July and 15<sup>th</sup> October (critical period) and the ANPC services displayed online information of the most relevant forest fire incidents. Also, the Meteorological Institute (IM) provided online information concerning FWI and its forecast. The AFN also provided its partners with an online service for FWI mapping.

## **(b). Forest Fire Prevention**

### **(b).1. Forest fire planning**

The National Forest Authority kept its efforts in the forest fire planning at the local, municipal and regional (district) levels.

The municipal planning objective is pursued by the technical support to the municipalities forest offices, based in the Municipal Plans for Forest Fire Prevention (5 years planning) and the Municipal Operational Plans, which are part of the previous plans and are updated on a yearly basis.

The municipalities' forest offices provide technical support to the Municipal Commission for forest fires prevention and suppression. By the end of 2009 there were 242 municipal forest offices established and 262 Municipal Plans for Forest Fire Prevention and 256 Municipal Operational Plans approved. 92% of the municipalities are covered with Forest Fire Prevention Municipal Plans.

The regional level planning is assured by the Regional Forest Plans (for the entire continental land) and by regional maps of fire pre-suppression, updated each summer in cooperation with municipalities and District Commands for Relief Operations, at the district level.

### **(b).2. Forest fuel management**

Forest fuels management are one of the key-actions in the forest fire prevention domain. A total area of 27 611.47 ha were managed: 27 456.61 ha by specialized hand-crews and 154.86 ha with prescribed burning (37.17 ha forest stands and 117.69 ha shrublands). The prescribed burning was performed under the national programme GeFoCo, an AFN programme to promote and develop Prescribed Fire Specialist Group activities, increasing total treated area through this technique, and give

technical support to Prescribed Fire Plans. This program also allows professional training, not only for foresters but also to forest hand crews.

By the end of 2009, Portugal had 116 foresters and 385 personnel of the specialized hand-crews who attended training in prescribed burning.

## **(c). Forest fires operational prevention**

The National Guard (GNR) is responsible for the coordination of the surveillance of critical forest areas, detection of forest fires and for the law enforcement and the initial criminal investigation of forest fires.

### **(c). 1. Surveillance and detection**

The National Guard deployed the "Secured Forest Operation", between 15<sup>th</sup> May and 15<sup>th</sup> October, which promoted the realization of over 61 844 patrolling operations in the most critical forest areas. These patrolling operations represented 76% of a total of 81 374 operations.

In 2009, the Lookout Towers National Network was responsible for an increase of 55.5% in the detection of forest fires (first alert).

### **(c). 2. Law enforcement**

The application of the preventive measures defined in the Decree-Law 124/2006, altered by de Decree-Law 17/2009, was the main action of the National Guard. A total of 3 186 infractions were detected, mostly related with illegal agricultural use of fire and the lack of vegetation clearance around houses, keeping the same trend of 2008.

In the same period 105 suspects of crimes related with forest fires were identified and 16 were arrested.

### **(c). 3. Fire fighting strategy**

In order to cope with forest fires and to define an integrated fire-fighting strategy, the National Authority for Civil Protection, as it did in 2008, established an Operational Directive for the forest fire season of 2009, with the following main purposes:

Define a unique structure for Direction, Command and Control, and a Special Structure to Fight Forest Fires (DECIF);

Regulate institutional coordination and the cooperation and involvement of the organizations belonging to the Portuguese Integrated System for Relief Operations (SIOPS).

The Operational Directive was applied to all organizations and institutions which play a role in this field and was used as a base to elaborate both district and municipal emergency plans. It was also used as a reference to elaborate all directives, plans and orders that were applied to organizations involved in the Special Structure to Fight Forest Fires.

The Directive defined an operational concept based on the following principles:

- Unique command structure;
- Anticipation ability;
- Integrated response;
- Permanent safety;

And had the following objectives:

- Dissuasive surveillance;
- Well-timed detection;
- Immediate dispatch;
- Strong initial attack;
- Unity of command;
- Operation maintenance.

In order to accomplish all the above-mentioned objectives a time-line for operational response was defined with the following main steps:

**Anticipation**, which involved pre-positioning of surveillance and initial attack teams, as well as fire-fighting, back up and specialized teams; aircrafts were employed in armed monitoring operations;

**Initial Attack**, which implicated immediate dispatch of the initial attack resources, especially the aerial ones. Other foreseen activities were reconnaissance and initial evaluation of the situation, transfer of command so that the operations may be correctly organized, and permanent guarantee of recovering the structure's initial attack capacity. So, this phase is a first organized and integrated intervention.

**Enlarged Attack**, which implied immediate reinforcement of operations, in accordance with the principle of subsidiarity but also of anticipation, ensuring the necessary tactical decisions to defend forest and houses, and

activation of different teams such as fire analysis or/tactical restraint fire teams. The activation of an Enlarged Attack depends on the following: if after 90 minutes, the fire is not extinguished or declared circumscribed by the incident commander, the District Coordination Centre forwards reinforcement groups.

**Post-Fire Operations and Active Surveillance**, which implied the elimination of all living embers and isolation of the material in slow combustion, so as to avoid the fire becoming active again.

*(Sources: Ministry of Agriculture, Rural Development and Fisheries - National Forest Authority and National Authority for Civil Protection, Portugal)*

### 1.1.2. Spain

#### *Fire danger in the 2009 fire season*

The year started with average temperatures in January and February. March was unusually warm throughout the entire country apart from the Balearic Islands, and the number of fires in this month was higher than average.

In April temperatures returned to the norm. May was a very warm month in general with mean temperatures between 2 and 3° C above their normal means in most peninsular regions. May was also dry in most parts of the mainland and islands, with the rain deficit particularly pronounced in the Mediterranean, western and central areas of Andalucía and both Castillas and Extremadura.

June was extremely warm for the whole of Spain and the Balearic Islands. Compared with the reference period 1971-2000 it ranked fourth warmest in the last 50 years, behind 2003, 2005 and 2004. In the Canary Islands this month was also generally very warm, but above 2000 metres altitude it was normal or slightly cool. This was a dry month for the whole of the peninsula and Balearics, and the Canary Islands were very humid.

The month of July was also very warm for the whole country (the sixth warmest July since 1961). Rainfall during July was below normal for the month within the Peninsula and Mallorca. The only significant and widespread rains were in the northwest and north of the peninsula. Throughout the month of July, weather conditions meant that the fire risk was very high for most areas. Added to the effects of wind, affected areas reached values more typical of August. This situation is not exceptional, as similar situations have occurred in other years, as in the case of 2002 and 2005, and may lead to occurrences of large fires causing a significant impact on many areas of the forest land. For example, from 14 to 22 July there were 3 large lightning fires which affected 12 268 hectares, over 22% of the total area burnt by large fires (i.e. fires over 500 ha).

The month of August was very warm throughout the country and only surpassed by the years 2003 and 1991 since 1961. In the Balearics and the Canary Islands it was also very warm but with lower thermal anomalies. August was also dry with rainfall 30% less than the normal total on the mainland.

September was warm and dry on the mainland and in the Canary Islands, especially in the northern part of the country. The Balearic Islands showed a normal temperature for the time of year. It was a humid month for the whole of the mainland.

It was the fourth warmest October since 1971 (after 1995, 1997 and 2006). It was also a dry month with a monthly rainfall total of only 77% of the 1971-2000 average. The warm, dry weather continued into November. However it was wet in Galicia, Cantabria, Navarre and the northwest corner of Castilla y León.

The month of December was slightly colder than normal and was also very wet overall, with an average rainfall value nearly twice the monthly average over the reference period 1971-2000. Therefore, this month ranks as the wettest December since 1996 and the fifth wettest in the last 60 years.

#### *Number of fires and affected surfaces*

The provisional numbers of fires and burnt areas for 2009, according to the data provided by the Autonomous Regions, are shown in Table 7. The worst affected regions in 2009 were Castilla y León and Aragón. The total number of fires is higher than in 2008 but remains below the average for the last 10 years.

The general trend over the last 10 years is a decrease in the number of fires. There was a peak in 2005 with 25 492 and the decade average is 18 626. The total for the year 2009 (15 391 fires) is 3 235 fires below that average.

There is also a declining trend in total area affected over the last 10 years. There was a peak in 2005 with 188 697 ha affected and the minimum occurred in 2008 (50 321). The average of the decade 1999-2008 was 123 441 ha and in 2009 the total was 10% below this average.

The percentage of forest land affected remains stable in recent years at around 36%.

Figure 8 shows the trend in fires during the twelve months of the year, distinguishing between small fires of <1 hectare and fires  $\geq 1$  ha. Larger fires outweigh the small ones in February and March, but in the remaining months there was a higher number of small fires. From May, both this year and for the corresponding 10-year average, the relative percentage of small fires is significantly higher in the summer months than in winter. In



August, the proportion of small fires against the total is 81.48%.

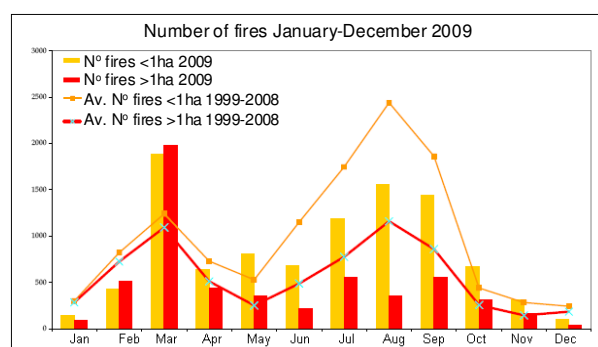


Figure 8 Annual progression of number of fires 2009

Figure 9 shows that in 2009, four months (March, May, July and October) exceeded the average figures of total burnt area. However, in August the 2009 total was significantly below the 10 year average (16 872 ha less).

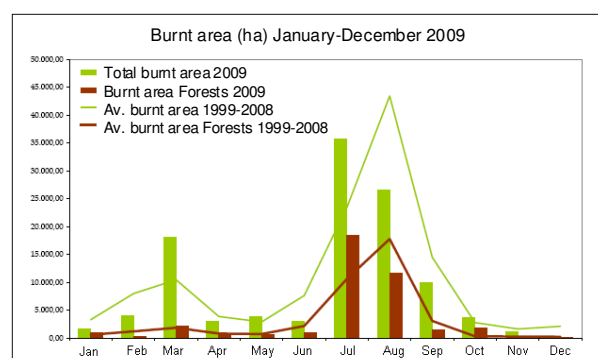


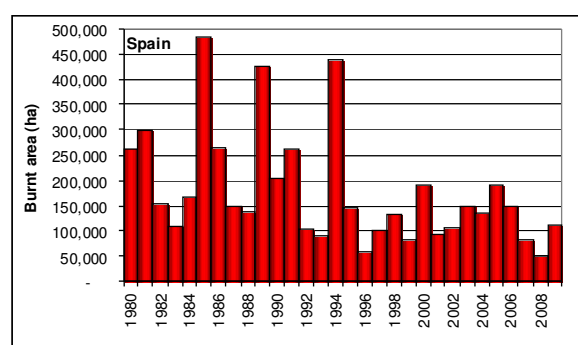
Figure 9 Annual progression of burnt area 2009

In 2009 there were 34 large fires (with an affected area of at least 500 ha) according to information supplied to the Area of wildland fire management by the Autonomous Communities. The percentage area of forest land affected by this type of fire is around 50% of the total affected in 2009. The causes and affected area of these 34 large fires are given in Table 6.

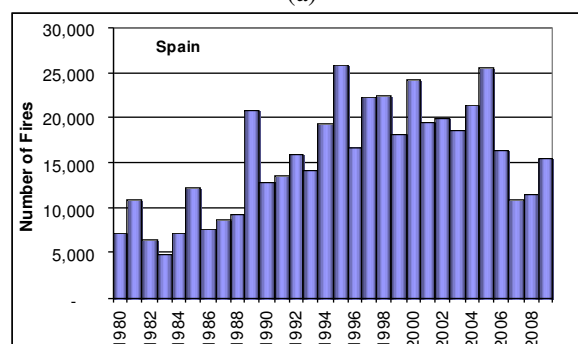
Table 6 Causes and areas affected by large fires >500 ha

Cause	Number of fires	Affected area (ha)
Unknown	15	14 683
Intentional	8	13 295
Negligence	6	12 849
Electric line	2	2 289
Lightening	3	12 268

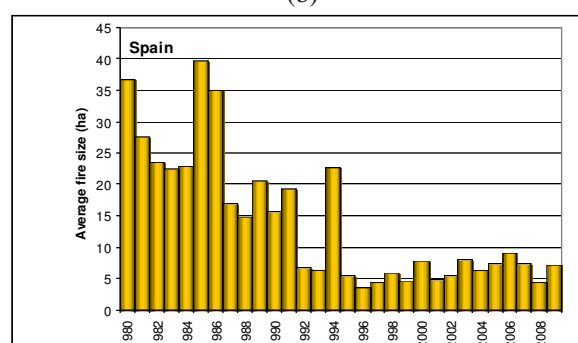
The yearly trends in terms of numbers of fires and burnt areas during the last 30 years in Spain are shown in Figure 10.



(a)



(b)



(c)

Figure 10. Burnt areas (a), number of fires (b) and average fire size (c) in Spain for the last 30 years.

## Prevention measures

### Awareness and information campaigns

**Media campaigns** - An awareness campaign was launched during the month of August, and information was given through television, radio and print media, finishing in October. Campaigns of this kind have been made for 50 years, helping to increase the environmental awareness of the Spanish population.

**School campaigns** - During 2009 there were more than 1 000 performances in schools and colleges in Spain, giving information to raise awareness on environmental issues, social and economic factors caused by fires, its causes and how it can be avoided.

**Rural Campaigns** - In these campaigns direct actions are intended for the rural population and include theatrical performances trying to sensitize

the population about the most common types of negligence. They consist of theatrical performances in areas of the country where the incidence of forest fires for agricultural and livestock causes is significant. They transmit a message about the importance of human action to prevent fires. During the year 2009 there were 37 performances.

#### Coordination Centre (Area Defense Against Forest Fires)

The Department of Defense Against Forest Fires is the administrative body responsible for providing state support to the Autonomous Communities to cover the forest fire under Article 7.2.c) of the Act 43/2003 on Forestry. In the period between June 1 and September 30 the activity of the Coordination Centre can be summed up as follows:

- Requests for support to the autonomous communities by means of MARM: 353
- Fire Interventions: 1986
- Provinces Served: 45
- Real-time updates of information in CIRCA information system tool 7304
- CIRCA Queries: 22660

#### Preventive Work Brigades (*Brigadas de Labores Preventivas*: BRIF).

The BRIF staff work on prevention measures during the months in which the risk of fire is lower. This preventive silvicultural work includes the reduction and control of forest fuels, making the mountains more resistant to the start and spread of fire and facilitates the extinction in the event of a fire. Fuel control is achieved mainly by the breakdown of spatial continuity between the layers of vegetation, through clearings, pruning, thinning, etc. For this, the brigade staff are trained in the use of all types of forest tools and techniques of vegetation management. The brigades are headed by a technical forestry training college and are organized into teams headed by a foreman, who supervises the execution of work. The brigades are made available to government and forest owners, performing those tasks that are necessary to reduce the risk of fire in the mountains.

#### Comprehensive Prevention Teams (EPRIF)

In 1998, after several years of experience and preventive practices, EPRIF were created to develop an intervention in territory that directly affects the population and the problems and causes that often lead to fires. During the 2009/2010 season there were 18 EPRIF teams

distributed nationally, in counties and areas of high fire risk. Its main actions are controlled burning, scrub clearance, awareness and expertise. The current distribution of EPRIF personnel addresses the specific problems in the northwest peninsula and various other locations in the State territory.

#### Latin America

During the month of September was the XXIV Latin American Advanced Course on Forest Fire Protection, in collaboration with the Spanish Agency for International Development Cooperation (AECI) in the National Center for Environmental Education - Valsaín (Segovia), which involved 18 technicians responsible for forest fires in the different administrations of 13 Latin American countries. Participants evaluated the course very positively, considering it a great opportunity for technical exchange of experiences and acquiring new knowledge.

#### *Loss of human lives in the 2009 fire campaign.*

Forest fires in Spain caused, during 2009, the deaths of 12 people, including 10 forest fire fighters and 2 civilians.

Forest fires, in some cases, caused large damages to human infrastructures and lead to the evacuation of the population when they happened close to urban settlements. However, forest fires with civil protection incidences accounted only for 1.03% of the total number of fires (15 391).

#### *Operations of mutual assistance*

In response to requests for assistance, Spain has intervened in 13 cases in Portugal with a total of 72:45 hours of flight time and 283 discharges. Spain received aid from Portugal, with the intervention of an amphibious aircraft, in two of the fires in Aragón: Aliaga and La Mata de los Olmos on 25 July and Aliaga on 26 July.

#### *Expenses*

For the year 2009, the budget was increased by 2 449 thousand Euro to a total of around 67 million Euro for fire extinction, and by 13 903 thousand Euro in prevention to make a total of nearly 44 million Euro. In addition the budget for forest fire prevention was increased in 11 million Euro allocated to the "removal of residual biomass" and 9 million Euro allocated to silvicultural practices aimed at watershed restoration.

Table 7. Forest Fires from January 1st to December 31st 2009 (provisional data, 14.01.2010)

PROVINCIA / COM. AUTONOMA	Num. Sinietros		SUPERFICIES				% SUPERFICIE respecto a la existente	
	Conatos < 1 ha	Incendios ≥ 1 ha	Forestal Leñosa			Forestal Herbácea	% ARBOLADA	% FORESTAL
			Arbolada	Matorral y M.Bajo	Total			
Alava	36	15	453,67	218,91	672,58	59,10	0,356	0,406
Gulpiuzoa	23	10	6,99	19,83	26,82	0,00	0,006	0,019
Vizcaya	12	30	41,94	43,56	85,50	3,76	0,035	0,060
<b>PAIS VASCO</b>	<b>71</b>	<b>55</b>	<b>502,60</b>	<b>282,30</b>	<b>784,90</b>	<b>62,86</b>	<b>0,140</b>	<b>0,181</b>
Barcelona	292	14	175,06	78,76	253,82	1,37	0,044	0,053
Girona	158	16	41,19	28,09	69,28	2,17	0,013	0,018
Lleida	96	40	386,57	1.341,78	1.728,36	99,97	0,098	0,255
Tarragona	128	23	653,25	636,52	1.289,77	3,20	0,304	0,472
<b>CATALUÑA</b>	<b>674</b>	<b>93</b>	<b>1.256,06</b>	<b>2.085,15</b>	<b>3.341,22</b>	<b>106,71</b>	<b>0,099</b>	<b>0,186</b>
A. Coruña	565	173	354,50	646,03	1.000,53	0,00	0,088	0,196
Lugo	356	159	270,87	1.591,14	1.862,01	0,00	0,057	0,279
Ourense	1.181	613	1.228,49	5.323,65	6.552,14	0,00	0,378	1,127
Pontevedra	790	142	341,88	837,81	1.179,69	0,00	0,155	0,390
<b>GALICIA (*)</b>	<b>2.892</b>	<b>1.087</b>	<b>2.195,74</b>	<b>8.398,63</b>	<b>10.594,37</b>	<b>0,00</b>	<b>0,154</b>	<b>0,514</b>
Almería	64	31	311,83	8.261,93	8.573,76	0,00	0,347	1,528
Cádiz	67	13	178,77	225,81	404,58	0,00	0,145	0,103
Córdoba	94	15	18,46	78,81	97,27	0,00	0,008	0,016
Granada	83	22	22,71	239,13	261,84	0,00	0,012	0,044
Huelva	175	48	143,96	201,07	345,03	0,00	0,031	0,045
Jaén	114	17	383,20	892,77	1.275,97	0,00	0,157	0,205
Málaga	69	25	132,97	840,11	973,08	0,00	0,145	0,323
Sevilla	141	27	82,10	168,18	250,28	0,00	0,042	0,053
<b>ANDALUCIA (**)</b>	<b>807</b>	<b>198</b>	<b>1.274,00</b>	<b>10.907,81</b>	<b>12.181,81</b>	<b>0,00</b>	<b>0,077</b>	<b>0,282</b>
<b>ASTURIAS (*)</b>	<b>826</b>	<b>1.268</b>	<b>300,84</b>	<b>6.046,16</b>	<b>6.347,00</b>	<b>161,56</b>	<b>0,092</b>	<b>0,975</b>
<b>CANTABRIA</b>	<b>97</b>	<b>493</b>	<b>814,92</b>	<b>2.932,87</b>	<b>3.747,79</b>	<b>807,15</b>	<b>0,521</b>	<b>1,409</b>
<b>LA RIOJA (*)</b>	<b>72</b>	<b>32</b>	<b>58,13</b>	<b>288,15</b>	<b>346,28</b>		<b>0,049</b>	<b>0,118</b>
<b>MURCIA (*)</b>	<b>105</b>	<b>15</b>	<b>61,22</b>	<b>35,77</b>	<b>96,99</b>	<b>105,01</b>	<b>0,052</b>	<b>0,069</b>
Alicante	95	18	1.042,14	414,75	1.456,89	1,13	1,694	0,589
Castellón	95	20	800,19	378,33	1.178,52	3,08	0,541	0,296
Valencia	176	33	96,50	205,05	301,55	11,71	0,034	0,055
<b>COM. VALENCIANA</b>	<b>366</b>	<b>71</b>	<b>1.938,83</b>	<b>998,13</b>	<b>2.936,96</b>	<b>15,92</b>	<b>0,393</b>	<b>0,243</b>
Huesca	91	19	17,34	45,94	63,28		0,004	0,007
Teruel	92	26	11.111,90	603,40	11.715,30		2,742	1,303
Zaragoza	151	56	2.134,35	8.675,40	10.809,75		1,081	1,511
<b>ARAGÓN (*)</b>	<b>334</b>	<b>101</b>	<b>13.263,59</b>	<b>9.324,74</b>	<b>22.588,33</b>		<b>1,336</b>	<b>0,911</b>
Albacete	103	16	323,95	694,95	1.018,90	560,75	0,145	0,251
Ciudad Real	52	44	38,57	521,51	560,08	254,05	0,037	0,098
Cuenca	175	41	4.371,53	215,33	4.586,86	71,78	0,942	0,548
Guadalajara	175	45	139,40	135,56	274,96	49,57	0,047	0,044
Toledo	155	86	112,34	381,14	493,48	412,82	0,209	0,213
<b>CASTILLA LA MANCHA</b>	<b>660</b>	<b>232</b>	<b>4.985,79</b>	<b>1.948,49</b>	<b>6.934,28</b>	<b>1.348,97</b>	<b>0,438</b>	<b>0,238</b>
Las Palmas de Gran Canaria	54	9	2,00	14,94	16,94	11,87	0,013	0,012
S.C. de Tenerife	50	10	2.905,13	525,08	3.430,21	156,25	3,640	1,468
<b>CANARIAS</b>	<b>104</b>	<b>19</b>	<b>2.907,13</b>	<b>540,02</b>	<b>3.447,15</b>	<b>168,12</b>	<b>3,044</b>	<b>0,744</b>
<b>NAVARRA</b>	<b>466</b>	<b>169</b>	<b>579,03</b>	<b>976,59</b>	<b>1.555,62</b>	<b>43,71</b>	<b>0,168</b>	<b>0,302</b>
Badajoz	165	144	153,02	175,31	328,33		0,065	0,033
Caceres	465	232	2.265,85	2.086,81	4.352,66		0,449	0,338
<b>EXTREMADURA (**)</b>	<b>630</b>	<b>376</b>	<b>2.418,87</b>	<b>2.262,12</b>	<b>4.680,99</b>		<b>0,327</b>	<b>0,205</b>
<b>ILLES BALEARS</b>	<b>105</b>	<b>12</b>	<b>51,36</b>	<b>36,28</b>	<b>87,64</b>	<b>22,02</b>	<b>0,047</b>	<b>0,054</b>
<b>MADRID</b>	<b>268</b>	<b>58</b>	<b>15,57</b>	<b>61,03</b>	<b>76,60</b>	<b>247,71</b>	<b>0,010</b>	<b>0,083</b>
Avila	177	76	3.055,18	908,59	3.963,77	248,80	2,355	0,828
Burgos	144	45	743,85	226,99	970,84	79,83	0,208	0,137
León	239	520	1.542,09	10.535,60	12.077,69	608,41	0,922	1,405
Palencia	84	77	235,01	200,89	435,90	163,58	0,324	0,176
Salamanca	280	120	304,52	1.078,56	1.383,08	333,93	0,222	0,212
Segovia	70	14	5,28	18,18	23,46	53,09	0,003	0,007
Soria	73	21	70,13	386,73	456,86	523,67	0,022	0,072
Valladolid	48	27	61,42	13,98	75,40	64,00	0,059	0,050
Zamora	267	361	883,69	5.047,51	5.931,20	550,54	0,728	1,293
<b>CASTILLA Y LEÓN</b>	<b>1372</b>	<b>1261</b>	<b>6.901,17</b>	<b>18.417,03</b>	<b>25.318,20</b>	<b>2.623,85</b>	<b>0,435</b>	<b>0,619</b>
<b>CEUTA</b>	<b>0</b>	<b>2</b>	<b>3,50</b>	<b>0,00</b>	<b>3,50</b>	<b>0,00</b>	<b>0,854</b>	<b>0,262</b>
<b>MELILLA</b>	<b>0</b>	<b>0</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,00</b>	<b>0,000</b>	<b>0,000</b>
<b>TOTAL</b>	<b>9.849</b>	<b>5.542</b>	<b>39.528,35</b>	<b>65.541,27</b>	<b>105.069,63</b>	<b>5.713,59</b>	<b>0,357</b>	<b>0,428</b>

(Source: Ministerio de Medio Ambiente y Medio Rural y Marino, Dirección General de

Medio Natural y Política Forestal, Área de Defensa Contra Incendios Forestales, Spain).

### 1.1.3. France

#### *Fire danger in the 2009 fire season*

In the Mediterranean region, the fire danger level was relatively high during the summer of 2009, characterized by a severe drought (rainfall was only 50% of average), high temperatures and a high number of days with low humidity. However, the summer was not very windy, which was a positive feature. In other French regions, temperatures were also above normal and with low rainfall.

The most significant negative factor resulted from the storm KLAUS that hit much of the Landes forests in January, affecting 600 000 hectares (half of the forest area) and rendering it partially inaccessible to vehicles to fight against fires. In addition, the volume of fallen wood (40 million m<sup>3</sup>) increased the fuel mass on the ground.

Since the forest was less accessible to local land resources, the commitment of national aerial resources thus became more necessary than usual.

#### *Fire occurrence and affected surfaces*

Around 17 000 hectares were affected by 4 800 fires in France during 2009 (average 1998-2008: 22 500 ha). In a general context marked by high temperatures and severe drought, affected areas are 25% less than the average, which shows the good performance of the overall measures taken this year. The yearly trends in terms of numbers of fires and burnt areas during the last 30 years in France are shown in Figure 11.

#### *Mediterranean zone:*

The Mediterranean departments are traditionally the most sensitive to forest fires. 11 100 ha were affected by fire last year, including 8 300 ha during the summer period, which is below the average for summer (13 140 ha for the period 1999-2008, and 32 000 ha before the implementation of a new strategy based on prevention in the late 1980s). The number of fires is also in sharp decline: 1 960 fires were recorded, of which 1 065 were during the summer (average: 1 200).

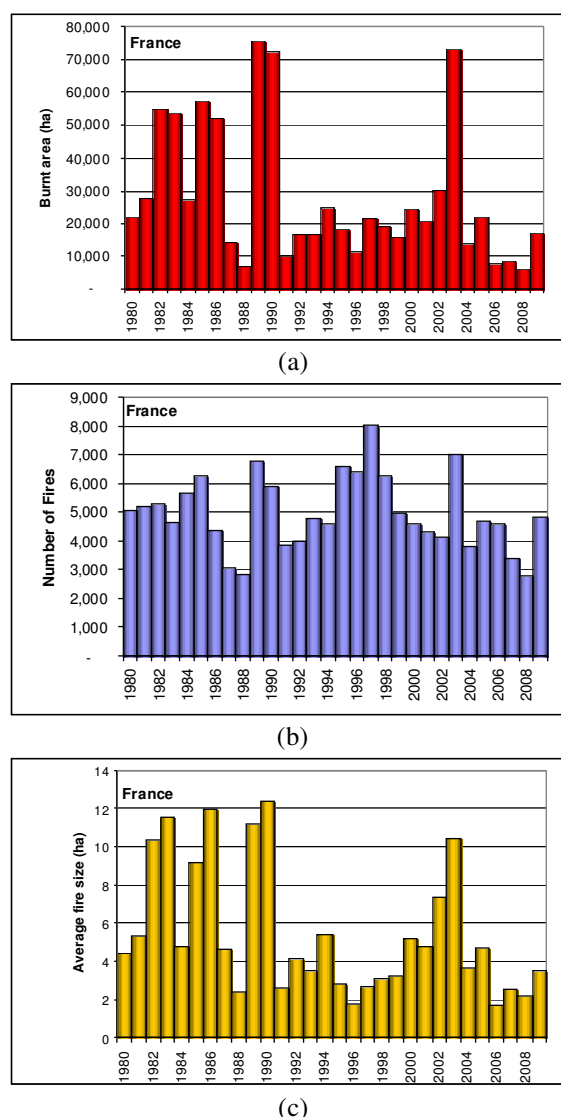


Figure 11. Burnt areas (a), number of fires (b) and average fire size (c) in France for the last 30 years.

#### *Major fires:*

July 22 in Marseille (1 070 ha)

July 23 in Corse-du-Sud, Propriano (3 200 ha), Sartene (1 200 ha) and Peri (750 ha). These fires spread in exceptional meteorological conditions, marked by record high temperatures (over 43°C) and very low humidity (10%), which triggered the simultaneous outbreak of several fires (mostly accidental in origin, 6 of them being related to electrical installations).

October 2 in Vendémian (Hérault 1 100 ha).

Other notable fires occurred in Muy in the Var Province (210 ha) on August 3, and Valcebollère in the Pyrénées-Orientales (170 ha) on October 16.

In the departments of the Landes massif, 970 ha were affected (300 ha during the summer season) against 1 000 ha on average. The largest fire in the Landes occurred at MEILHAN. This burned 200 ha on June 28.

The departments of the Pyrenees also experienced significant operational activity, mainly in late winter and early spring 2009. These fires, which covered 2 200 ha, were often associated with pastoral practices.

#### *Fire fighting means*

To support local firefighters, the Ministry of Interior has made available national resources of which the most important are listed below:

- The water bomber aeroplanes (twelve CL415 planes and two DASH 8 heavy air tankers with a payload of 10 tons, whose primary mission is to provide a retardant line for containing dangerous fires, to protect sensitive areas and to support the action of ground troops; and 9 Tracker planes mobilized primarily through the military air watch) performed 3 860 hours of flying time, 1 600 hours of which were for aerial fire detection, intervening in 390 fires.
- The military sections of the civil protection deployed on the mainland (4 detachments) and in Corsica (7 sections) were engaged 180 times and provided support to 500 ground missions.
- The reserve firefighters prepared to reinforce local logistics units facing difficult situations, were activated several times. Inputs of these reinforcements from areas with relatively few forest fires to supplement the workforce mobilised against the largest fires or in areas of highest risk amounted to 6 300 man-days.
- Meanwhile the Ministry of Forestry (MAAP) has made available over 200 forestry personnel specialized in defence against forest fires to the prefects of departments. These personnel completed 7 650 missions of surveillance and alert and intervened in 240 incipient fires.

#### *Loss of human lives*

Although on several occasions, particularly for fires occurring in Corsica and Marseilles, built-up areas were threatened or affected (70

buildings on the only fire in Peri which started in South Corsica), relief action has helped protect people and there were no deaths either of citizens or among the rescue services.

#### *Operations of mutual assistance*

French air assets (two CL415) were engaged in Greece on 23-26 August.

#### *Assistance through the EU Forest Fire Tactical Reserve – pilot project.*

The DSC (Direction de la Sécurité civile) responded to a call for proposals issued by the European Commission for the rental of a module consisting of two amphibious aircrafts with authority to intervene on behalf of the EC in all Member States. This module consisting of two CL-215 planes was positioned at Bastia and was hired by COGIC (Centre Opérationnel de Gestion Interministérielle des Crises) following favourable judgement from the MIC. The module constituted the so-called EU Forest Fire Tactical Reserve of the Monitoring and Information Centre of the EC Civil Protection Unit.

240 hours of operational flight were provided for the benefit of four countries: Portugal (146), Greece (41), Italy (37), France (16).

In the first analysis, this operation has shown the benefits of developing additional capacity for mutual assistance: these planes have been involved in situations where the operating environment did not enable normal bilateral reinforcements (July 23 in Corsica, 24 July in Italy ...)

*(Source: Ministère de l'Intérieur - Direction de la Défense et de la Sécurité Civiles; Ministère de l'Agriculture et de la Pêche - Bureau Forêt, Territoires et Chasse, France)*

### 1.1.4. Italy

#### *Forest fires in the 2009 fire season*

There were fewer forest fires in Italy in 2009 compared with previous years; in fact it can be considered one of the best in the last 40 years. However, unlike the number of events, the burned area was the highest since 2003 (except 2007 peak).

The disastrous events which occurred in Sardinia between the 23<sup>rd</sup> and the 26<sup>th</sup> of July, weighted heavily on the total at the national level.

In 2009, there were 5 422 fires recorded, burning a total area of 73 355 hectares, 31 060 of which were wooded land.

The yearly trends in terms of numbers of fires and burnt areas in Italy since 1980 are shown in Figure 12.

In Italy, forest fires occur in all regions. In winter they are located mostly in the Alpine regions (especially the northwestern regions), while in summer they are mostly concentrated in the Mediterranean regions (southern regions and islands). In Liguria, fires occur both in summer and winter. In recent years, in Mediterranean regions such as Lazio and Campania, winter fires also occur.

Table 8 shows the distribution of fires in 2009 by region. An analysis of the data shows that 2009 was not a critical year. Indeed, the comparison with historical data on an annual basis shows that only exceptionally have there been fewer fires. On the contrary, 2009 was one of the years with the highest burned area.

As far as number of fires is concerned, Campania was the most affected region (903), while the largest burned area was found in Sardinia (total: 37 104 ha; wooded: 12 270 ha).

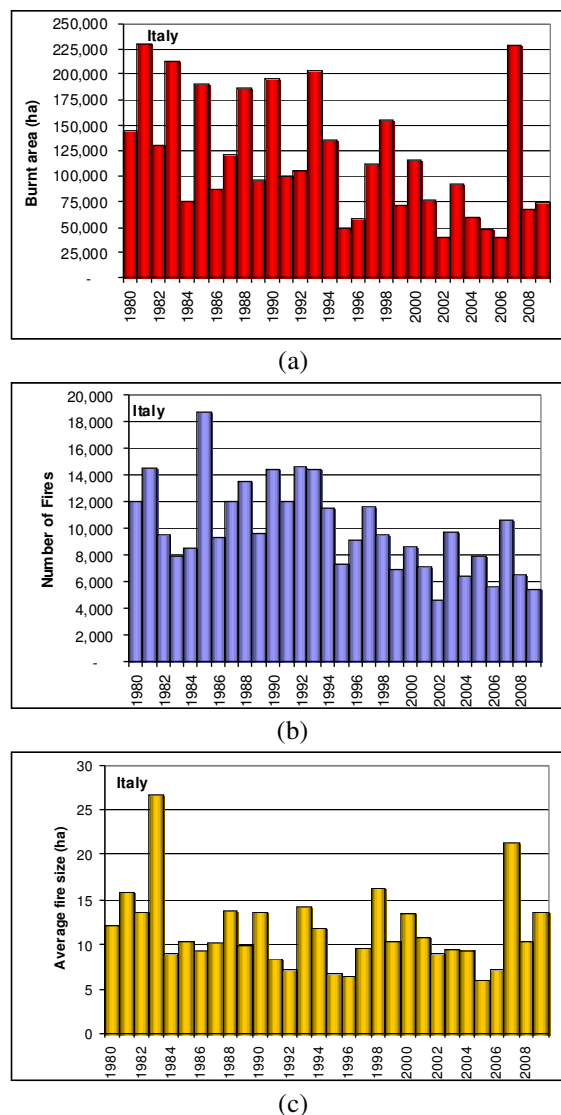


Figure 12. Burnt areas (a), number of fires (b) and average fire size (c) in Italy for the last 30 years.

In 2009 the number of fires was about 15% less than in 2008, while the wooded burned area was about 2.6% more. As usual, forest fires mainly occurred in southern regions.

Due to extreme weather conditions which occurred in the last part of July, the Sardinia region suffered huge damage in 2009. In particular, on the 23<sup>rd</sup> of July, 5 large fires each caused thousands of burned hectares.

Table 8. Forest fires by region in Italy 2009

Region	#Fires	Burned area			
		Wooded	Non wooded	Total	Average
VALLE D'AOSTA	13	2	5	7	0.5
PIEMONTE	117	286	87	373	3.2
LOMBARDIA	138	268	128	396	2.9
TRENTINO A. A.	48	4	1	5	0.1
VENETO	99	30	24	54	0.5
FRIULI V. G.	73	198	156	354	4.8
LIGURIA	332	1 489	1 155	2 644	8.0
EMILIA ROMAGNA	86	69	102	171	2.0
TOSCANA	549	1 407	431	1 838	3.3
UMBRIA	56	44	11	55	1.0
MARCHE	19	38	25	63	3.3
LAZIO	325	1 802	726	2 528	7.8
ABRUZZO	34	104	55	159	4.7
MOLISE	49	75	111	186	3.8
CAMPANIA	903	4 881	1 321	6 202	6.9
PUGLIA	277	1 527	2 831	4 358	15.7
BASILICATA	142	651	390	1 041	7.3
CALABRIA	716	4 114	3 087	7 201	10.1
SICILIA	762	1 801	6 815	8 616	11.3
SARDEGNA	684	12 270	24 834	37 104	54.2
<b>TOTAL</b>	<b>5 422</b>	<b>31 060</b>	<b>42 295</b>	<b>73 355</b>	<b>13.5</b>

### Major fires in 2009

The largest fire occurred in Sardinia (municipality of Bonorva, province of Sassari). The fire started on July 23 and quickly reached large proportions favoured by high temperatures (about 40°C) and strong winds. The fire killed a farmer and burned 9 500 hectares, 1 569 of which were wooded. The Bonorva fire was one of the largest fires in Italy of all time. The fire had deliberate causes and investigations are still ongoing.

The other four worst fires also occurred in Sardinia on the same day (July 23). Near Suni (province of Oristano), a fire of huge proportions affected 5 161 hectares, 2 165 of which were woodland.

In the countryside of Ittiri (province of Sassari) a large fire developed, affecting 4 610 hectares, 670 of which were woodland.

The municipality of Pau in the province of Oristano was affected by a large fire, burning 2 453 hectares, including 1 122 of woodland.

In Olbia, province of Olbia Tempio a huge fire burned 2 312 hectares (1 452 wooded).

### Fire fighting means and information campaigns

Despite the reduction in number of fires and forest fires, Italy is among the European countries where the phenomenon is particularly serious.

In many Italian regions, the majority of fires are detected and extinguished when the fires are of minimal size, so that only few fires escape control. However, these few fires are those determining the greater part of the burned area and often also affect urban areas and infrastructures, causing serious damage and particular concern.

In synthesis in Italy:

- the number of fires has tended to decrease, although modestly, since 1985;
- there are significant variations from year to year and among regions;

The phenomenon of forest fires is not generalized throughout the country, as about 50 out of the 110 provinces are most affected and therefore these should be the focus of attention. The fire fighting system, which in some regions has reached levels of excellence, is fragile overall.



In Italy the Regions have the primary responsibility in the field of forest fires and, through international conventions and program agreements, make use of the State Forest Service (CFS) for prevention, preparedness, coordination in the regional operating rooms and in the survey of burned areas, and the National Service of Fire Brigades for active fire-fighting and in the regional operating rooms.

For environmental emergencies (such as forest fires) there is the public phone number **1515**, (Italian Forest Corps) active 24 hours a day, which coordinates the activities of specific emergency patrols, in addition to the specific number 115 (Fire Brigades).

Territorial monitoring for fire prevention, investigation and law enforcements are carried out independently by highly specialized staff to identify causes of ignition, and are of paramount importance. Monitoring and analysis of forest fires are supported by computerized procedures that enable the updating of the "Territorial Dossier" built up for the management of all the territorial information, used both by police and civil protection authorities.

Over the last year the Administration has given special attention to the professional training of staff.

In the EU, officers of the Italian Forest Corps are incorporated into the system of reinforced cooperation Fire 5 (*Force d'Intervention Rapide Europeenne 5* - Portugal, Spain, France, Italy and Greece): three at level 1 (*general*), one at level 2 (*advanced*), one at level 3 (*self-training*) and one at level 4 (*Experts exchange*). Three officers are also qualified for interventions in international emergency and humanitarian relief.

Entrusted by the Foreign Affairs Ministry and coordinated by the Civil Protection Department, the Italian Forest Corps organized a Forest Fire Fighting Course for Shouf Reserve Officers of Lebanon.

UN Food and Agriculture Organization and the Italian Forest Corps organized and co-financed the "Second workshop Forest Fires in the Mediterranean Prevention and regional Cooperation", which was held in Latakia, Siria, from the 13<sup>th</sup> to the 17<sup>th</sup> of November 2009.

During this meeting 13 Countries faced the problem of forest fires in Near East and North Africa, and international cooperation with the setting up of NENFIRE (Near East Regional network on Forest and Wildland Fires). The

workshop also discussed the new Turkish Forest Fire Fighting International School.

CFS also organized a Forest Fire Fighting Display under the coordination of the Civil Protection Department, on request of ISMI (Istituto di Stato Maggiore Interforze), the Joint Services Staff College of the Centre for Italian Army High Defence Studies. Within the scope of "Exercise 5+5" the display went over the decision-making processes and operations flow-chart which usually develop on field. The guests, coming from 5 EU Countries and 5 African ones, could compare the differences among national response organizations.

CFS participates in the decision making program for the "Determination of forest fire causes and harmonization of methods for reporting them", on behalf of the European Commission – Cemagref (public agricultural and environmental research institute).

CFS submits the forest fire prevention plans of national and regional parks and protected natural areas to examination.

#### *Fire causes and investigation activities*

Overall, the activities against forest fire crimes in 2009 made by the territorial offices of CFS, resulted in the reporting of 317 people to the Court of Justice, including 8 taken under arrest or under custody measures for fire arson.

Three motivational levels were found to be the basis of the phenomenon:

- a) negligence, that sometimes appears as irresponsibility, caused above all by the destruction of plant residue or cleaning land and wasteland;
- b) widespread illegality, linked to poaching wild boar; events caused by the people responsible and volunteers for extinguishing; reprisals;
- c) rural criminality, in situations where shepherds are linked to criminal contexts; intention to depreciate lands and woodland; intimidations; interests in subsequent construction and reforestation.

Regarding unintentional fire causes, the trend of previous years is confirmed.

Fires due to negligence were caused by either the removal of crop residues (117 – 37.5%), the burning of stubble (34 – 10.8%), the cleaning of fallow (19 – 4.5%), or the negligent use of



electrical or mechanical motor equipment in wooded or rural areas, which developed sparks causing fires (14 – 4.5%).

Overall, during the period 2000-2009 the perpetrators who have been identified and reported to the Court of Justice correspond to 7.8% of the total number of deliberate fires. In 2009 the percentage was 8.2%. This percentage may be considered satisfactory, given the high number of crimes, the framework of widespread illegality that characterizes the phenomenon, the vastness of the territories in which they committed the offenses and the multiplicity of motives and causes behind forest fires.

The investigations conducted in 2009 showed that 13.7% of the 43 people reported to the Court of Justice had a criminal record. The arrests were all made as a result of a complex investigative work in areas repeatedly affected by forest fires.

Several investigations were mainly carried out in the regions of Umbria, Calabria and Lazio, where the ignition points were identified, in order to collect evidence of traces of weapons or primers or combustion accelerators, in the search for the forest fire origin and cause.

In 2009, following a Directive of the Minister of Agriculture, Food and Forest Policies, funding has been provided to the territorial offices of Italian Forest Corps of the nine regions and twenty-two provinces most affected by the phenomenon to support activities against the crimes of arson.

#### *Loss of human lives*

In Table 7 the number of people that suffered injuries or lost their lives in forest fires during the last 32 years in Italy is given. In 2009 there were reported 4 casualties and 12 injuries.

Table 9. Injured people and victims of forest fires in Italy (1978-2009)

	<i>Injured</i>	<i>Victims</i>
1978	47	3
1979	32	10
1980	31	4
1981	40	9
1982	27	6
1983	39	15
1984	19	6
1985	93	16
1986	38	9
1987	104	3
1988	80	6
1989	80	12
1990	119	10
1991	55	6
1992	50	6
1993	76	12
1994	37	1
1995	12	1
1996	14	2
1997	97	5
1998	81	6
1999	34	6
2000	70	2
2001	23	3
2002	37	5
2003	75	7
2004	35	2
2005	43	3
2006	17	1
2007	26	23
2008	30	4
2009	12	4
<b>Average</b>	<b>49.2</b>	<b>6.5</b>

(Source: Ministero delle Politiche Agricole Alimentari e Forestali, Corpo Forestale dello Stato, Italy).

### 1.1.5. Greece

#### *Fire danger in the 2009 season*

From the provisional results of 2009, it seems that the burnt area level has remained low in comparison to results of previous years.

The 2009 summer was mild without extreme weather conditions except the last 10 days of August in which severe fire weather conditions were experienced.

During that time (21<sup>st</sup> August) the largest fire occurred, burning about 13 000 ha in the northeast part of the Region of Attica in wildland/urban interfaces where more than 100 houses were partially damaged. Because of this fire the Region of Attica became the most damaged region of the year, and because of some other fires that also occurred in the Sterea Region of Greece at the same time, this region is 2nd in the ranking of damages this year.

#### *Fire occurrence and affected surfaces*

During 2009, around 1 063 forest fires were recorded, the majority with a burned area lower than 1 ha. This number is still provisional and is likely to rise when compilation of figures is complete; however the number of forest fires is likely to remain relatively low in comparison to the results of previous years. The burnt area was also low, 35 342 ha, of which 74% occurred in wooded areas.

The provisional results of the fire campaign of 2009 in Greece are shown in Table 10. This comprises combined information according to data available from local Forest Service units and the availability of a mapping of burnt areas for 2009 based on 10 TM satellite images with spatial resolution of 30m. And so, while the available information about the number of forest fires is not complete, the respective information about areas burnt with the additional information of the mapping with satellite images should be satisfactory.

Table 10. Number of fires and burned area in 2009 by regional forest administration (provisional)

FOREST ADMINISTRATION AUTHORITIES	Total number of fires	# fires <1 ha	# fires 1-5 ha	# fires 5-100 ha	# fires 100-500 ha	# fires >500 ha	Total Burned area (ha)	Wooded Burned area (ha)	Non wooded Burned area (ha)
REG. EAST MAC. THR.	62	50	5	6	0	1	2434.9	1874.4	560.5
REG. CENT. MACEDONIA	50	41	3	1	5	0	81.3	72.7	8.6
REG. W. MACEDONIA	62	56	4	2	0	0	34.6	17.3	17.3
REG. IPEIROU	160	140	15	5	0	0	141.0	127.2	13.8
REG. THESSALIAS	72	46	11	14	1	0	452.2	387.4	64.8
REG. IONIAN ISLANDS	106	74	17	14	1	0	2912.17	2225.35	686.82
REG. W. GREECE	54	52	2	0	0	0	163.33	146.20	17.13
REG. ST. GREECE	227	172	21	31	2	1	9152.12	6139.96	3012.16
REG. ATTIKIS	-	-	-	-	-	-	16942.62	13360.78	3581.84
REG. PELOPONISOU	202	178	17	5	2	0	1270.11	860.58	409.53
REG. N. AIGAIUO	25	19	6	0	0	0	226.17	85.28	140.89
REG. S. AIGAIUO	8	6	1	1	0	0	676.35	241.44	434.91
REG. KRITIS	35	26	6	3	0	0	855.45	471.28	384.17
<b>TOTAL</b>	<b>1063</b>	<b>860</b>	<b>108</b>	<b>82</b>	<b>11</b>	<b>2</b>	<b>35342.32</b>	<b>26009.87</b>	<b>9332.45</b>

#### *Fire fighting means*

The personnel involved in suppression efforts comprise about 15 000 people, of which 9 500 are permanent personnel of the Fire Brigade which deals also with structural fires, and 5 500 are seasonally hired personnel just for the forest fire suppression activities.

The Fire Brigade of Greece owns about 1 560 engines, which are involved in both structural and forest fire suppression efforts, and a few smaller engines owned by Municipalities of high risk areas were involved occasionally in some incidents.

The aerial means used in the 2009 campaign are indicated in Table 11.

Table 11. Aerial means participating in the 2009 campaign

STATE OWNED MEANS			
AIRCRAFTS	LARGE	CL-215	13
		CL-415	8
	SMALL	PEZETEL	18
		GRUMMAN	3
HELICOPTERS		H/P PK 117	3
		SUPER PUMA	2
		TOTAL	47
HIRED MEANS			
HELICOPTERS	H/P MI-26		4
	H/P SIKORSKY 64		5
	H/P KA-32		5
		TOTAL	14

### Operations of mutual assistance

During the fire campaign for the fire that occurred on 21<sup>st</sup> August the mechanism of international assistance was activated and the assistance received is summarised in Table 12.

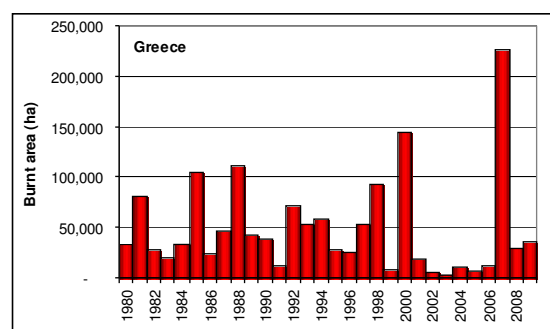
Table 12. European fleet participation in North Attica fire, 23-25 August 2009

COUNTRY	Aircraft Type	Number	Total flight work (hh:mm)
Italy	CL-415	2	33:13
EU FFTR	CL-215	2	18:19
Cyprus	KA-32	1	13:30
France	CL-415	2	12:26
Turkey	CL-215	1	2:35
Spain	CL-215T	2	
Total			80:03

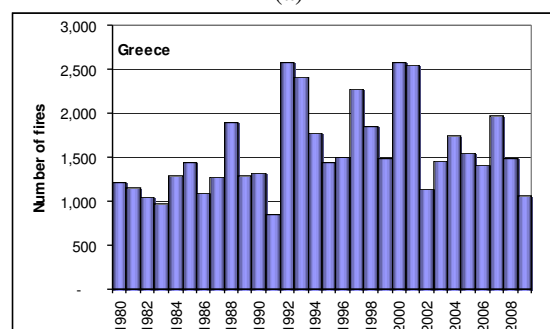
### Injuries and loss of human lives

During the 2009 fire season, there were no deaths and no major accidents.

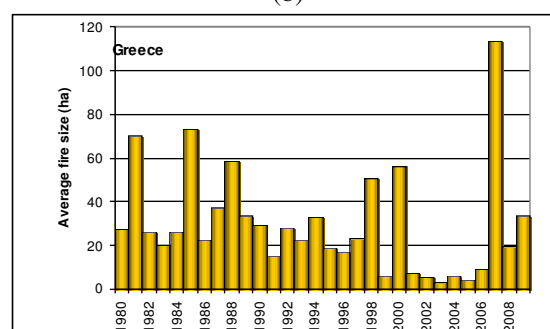
(Source: Ministry of Environment, Energy, and Climatic Change. Directorate General for Development and Protection of Forests and Natural Environment, Greece)



(a)



(b)



(c)

Figure 13. Burnt areas (a), number of fires (b) and average fire size (c) in Greece for the last 30 years.

## OTHER MEMBER STATES

The situation in the Other Member States of the EU is analysed separately because the figures in terms of numbers of fires and areas burnt differ significantly from those of the Southern States as presented in the previous chapter.

### 1.1.6. Austria

#### *Fire occurrence and affected surfaces*

In 2009, there were 612 wildland fires with a total burnt area of around 28 ha and 218 forest fires which resulted in 22 ha of burnt land.

Table 13. Number of fires and burned area in Austria in 2007

<i>Fire type</i>	<i>No. of Fires</i>	<i>Burned area(ha)</i>
<i>Wildland fires</i>	612	28
<i>Forest fires</i>	218	22
<b><i>Total</i></b>	<b>830</b>	<b>50</b>

A new database is planned for the Austrian fire service in cooperation with the University for Agricultural Science in Vienna. It is foreseen that this database should eliminate problems found in the past which sometimes resulted in the same fire being counted more than once. Totals from previous years may therefore change.

#### *Fire fighting means and information campaigns*

The area of Austria is 83 858 sq km. Austria is divided into 9 provinces, 15 towns with separate charter, 84 administration districts, and 2 350 municipalities. There are 4 567 voluntary fire brigades and 6 professional fire brigades (Vienna, Graz, Linz, Salzburg, Innsbruck, Klagenfurt). On average there are 2 fire brigades per municipality and a total of around 290 000 firefighters. Firefighters can follow special courses for forest fire fighting, in particular for actions in the mountain areas, and some of them are specialized for working with helicopters and airplanes. The response time for a fire is between 10 and 15 minutes (except for mountain areas) leading to a very small burned area per fire (e.g.: ~1 000 m<sup>2</sup>).

(Source: *The Austrian Federal Fire Brigade Association, Austria*)

### 1.1.7. Bulgaria

#### *Fire danger in the 2009 fire season*

The forest lands in Bulgaria comprise 4 089 494 hectares (ha) and occupy 37% of the territory of the country. Of this territory, 3 704 015 ha (89%) are wooded areas. Coniferous natural forests and plantations occupy 32% and deciduous forests occupy 68% of the total wooded area of the country.

Forest fires were never a serious problem in Bulgaria in the past, thanks to the natural and climatic conditions in the country. They have become a problem and a threat during the last 15 years, and in the periods 1999-2001 and 2007 they were a real disaster.

The analysis of the preconditions, reasons and factors leads to the conclusion that Bulgaria is now joining the Mediterranean region with a traditionally high risk of forest fires on its territory. The damages were not only economical ones but on a much bigger scale – inestimable damage for plant conditions, which led to erosion and destruction of the soils, to disturbing of the warmth and moisture balance of the ecosystems, to changes of the basic tree species, to the flora composition and the phytocenological structure, to changes in the water flow character, to worsening of the sanitary condition of the neighbouring unburned stands, to a sudden decrease of the CO<sub>2</sub> absorbing capacity of nature – all in all to total or partial destruction of the existing biogenocenosis.

During the last 10 years more than 150 000 ha of forests were affected by fires. 2007 was the second worst year in the history of the Bulgarian forests with 1 479 forest fires and 43 000 ha burned, followed by the year 2000 (1 710 forest fires and 57 406 ha burned)

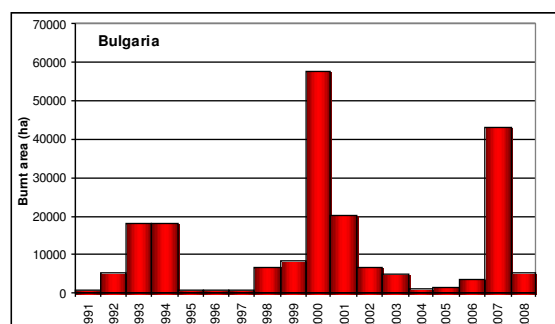
#### *Fire occurrence and affected surfaces*

The year 2009 contained two clear peaks for the number of fires. The first of them was in March and the second during August. Both of them are mainly connected with burning of stubble and vegetable residuals by farmers.

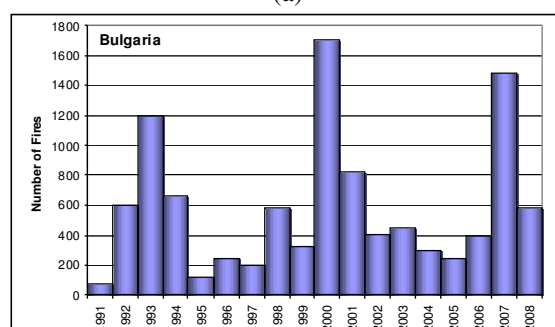
The most affected regions in 2009 were Kardzhali – 753 ha burnt, Lovech – 420 ha and Sliven – 260 ha.

Figure 14 shows trends in the number of fires and burnt areas in Bulgaria from 1991 to 2009.

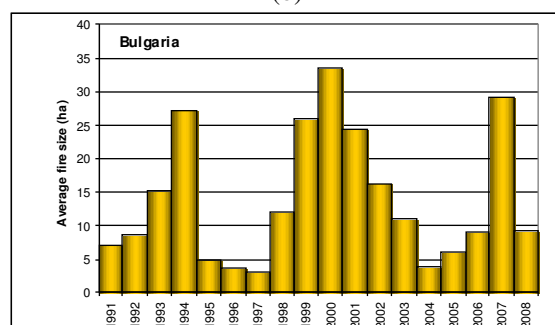
Detailed figures on burned area and fire causes during the last 11 years are presented in Table 14.



(a)



(b)



(c)

Figure 14. Burnt areas (a), number of fires (b) and average fire size (c) in Bulgaria from 1991 to 2009.

The main causes of forest fires during 2009 are as follows:

Carelessness – 230 (73%)

Arson - 12 (4%)

Natural - 2 (1%)

Unknown - 70 (22%)

The direct losses for 2009 are very low - 150 000 Euro, although the average costs for the last 15 years are 6 500 000 Euro per year.

Almost all the activities for forest fire prevention, monitoring, forecasting, suppression, etc. are financed by the state and municipality budget. The Executive Forest Agency in coordination with the National Fire Brigades within the Ministry of Interior are the main responsible authorities on combating forest fires. Through their Regional and Local Units and with the help of the Volunteer Formations, Army, and other stakeholders they organize and implement all the activities against forest fires

#### *Operations of mutual assistance*

No assistance was requested in 2009.

(Source: Executive Forest Agency, Sector Forest Fire Management, Bulgaria)

Table 14. Forest fire statistics for Bulgaria for the period 1999-2009

Year	Total number of fires	Burnt area (ha)		Fires causes (number of fires)		
		Total	Forest lands	by human activities	Naturally	unknown
1999	320	8291	4198	84	9	227
2000	1710	57406	37431	385	18	1307
2001	825	20152	18463	187	19	619
2002	402	6513	5910	150	7	245
2003	452	5000	4284	281	9	162
2004	294	1137	881	172	5	117
2005	241	1456	1456	125	7	109
2006	393	3540	3540	190	9	194
2007	1479	42999	42999	1163	18	298
2008	582	5289	5289	482	8	92
2009	314	2271	2271	242	2	70
Mean	637	14005	11520	315	10	313

### 1.1.8. Cyprus

#### *Fire danger in the 2009 fire season*

The year 2009 has been one of the best in the last decade. Both the number of forest fires and the total burnt area were the lowest in the last 10 years. The air temperature during summer months did not deviate significantly from other years. The cumulative precipitation was below or around normal in most areas during June and July 2009. Unlike the phenomenon of the previous years, with prolonged periods of hot and dry weather and precipitation far below normal, during August, September and October, unstable weather conditions prevailed, especially in the mountainous areas and the average precipitation during these months was well above normal.

#### *Fire occurrence and affected surfaces*

During the year 2009, a total number of 91 forest fires broke out in Cyprus affecting an area of 885 ha. Most of these fires (54%) were smaller than 1 ha. During the fire season 2009 a total number of 7 forest fires with burnt area equal or greater than 50 ha, were recorded. The trends regarding both the number of fires and burnt areas over the last 10 years (2000-2009) are shown in Figure 15.

#### *Injuries and loss of human lives*

In Cyprus during 2009, 8 fire fighters were injured in three different forest fires.

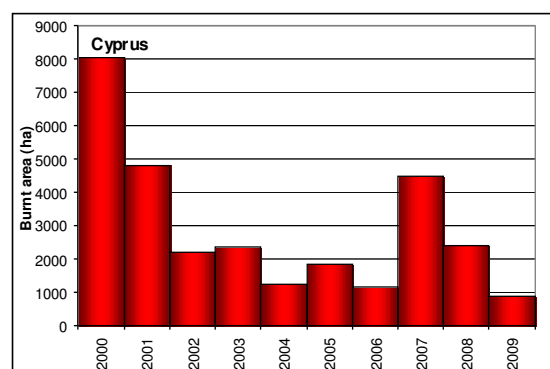
#### *Fire fighting means and information campaigns*

For the detection of forest fires, 27 permanent and temporary lookout stations were operated. A number of fires were also detected by forest officers on patrol as well as by citizens living nearby or passing through forested areas.

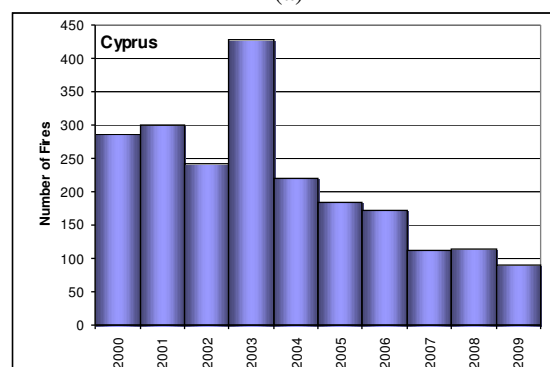
A number of 420 forest fire fighters were recruited during 2009 and were positioned in forest stations all over Cyprus. A large number of fire engines, crawler tractors and agricultural tractors were used in fire fighting operations during the summer of 2009. Additionally, a fire fighting aeroplane of the Department of Forests and three fire fighting helicopters that are leased by the Ministry of Interior every year, were used. Moreover, Army and Police

helicopters were also involved in some cases, in the fire fighting operations.

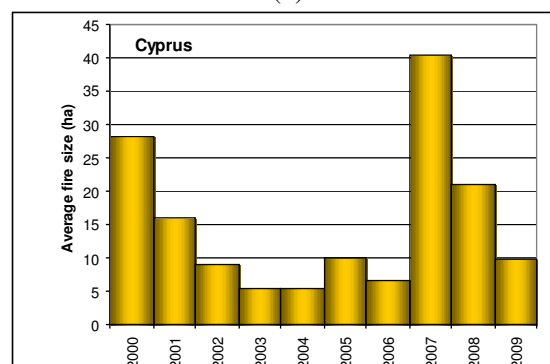
During the year 2009 a campaign aiming to inform the public about forest fire prevention practices, changing attitudes and behaviour and creating awareness about fire prevention was undertaken during the whole year and especially during the summer period. Through this campaign, students and other NGOs were informed about the importance of the forests and ways to protect them from fires. Moreover, training programmes on fire prevention and suppression methods were organized and materialized for the members of the fire fighting ground forces, as well as for members of other governmental services and volunteers.



(a)



(b)



(c)

Figure 15. Burnt areas (a), number of fires (b) and average fire size (c) in Cyprus from 2000 to 2009.

Table 15. Number of forest fires and burnt areas in Cyprus from 2005 to 2009

Year	Number of fires	Burned area (ha)		
		Total	Forest and other wooded land	Agriculture and other artificial land
2005	185	1838	962	876
2006	172	1160	888	272
2007	111	4483	3704	779
2008	114	2392	1997	395
2009	91	885	460	425

### Operations of mutual assistance

No assistance was requested in 2009.

(Source: Ministry of Agriculture, Natural Resources and Environment, Department of Forests, Cyprus).

### 1.1.9. Estonia

In 2009 a total number of 2 045 forest fires and wildfires were recorded: 47 of these were classified as forest fires (Table 16). Forest fires and wildfires caused the death of 1 person and destroyed 13 buildings. In comparison, in 2008, 1 991 forest fires and wildfires were recorded, 71 of which were classified as forest fires. Forest fires and wildfires caused the death of 1 person and destroyed 4 buildings. The burnt area, number of fires and average fire size for the years 2002-2009 are shown in Figure 16.

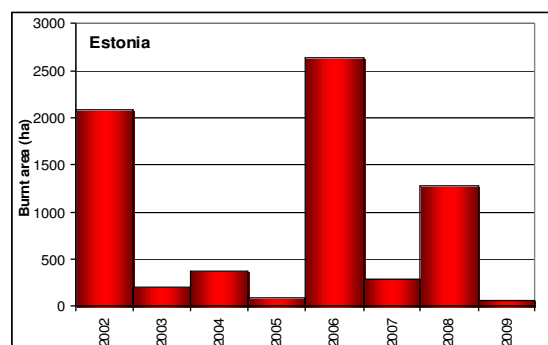
Table 16. Forest fires in Estonia 1999-2009

Year	Number	Area (ha)	Average area (ha)
1999	130	1103.4	8.5
2000	158	683.9	4.3
2001	91	61.8	0.7
2002	356	2081.7	5.9
2003	111	206.6	1.9
2004	89	378.9	4.3
2005	65	86.5	1.3
2006	250	3095.6	12.4
2007	64	292.4	4.6
2008	71	1279.8	18.0
2009	47	59.3	1.3

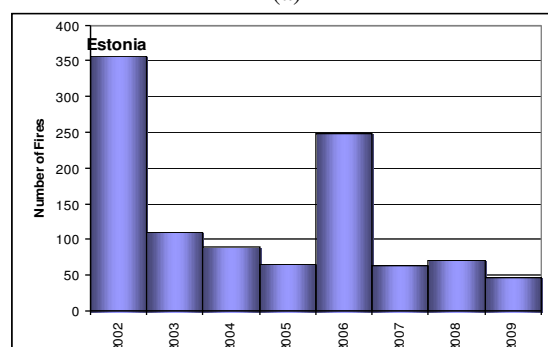
Forest fires in 2009 were recorded in 10 counties. The highest number of fires (16) was in the county of Harju. The first fire in 2009 was recorded in April, the last one in September. The largest fire of 2009 occurred in April in Harju county Kuusalu, burning an area of 14.6 ha.

The Rescue Board is responsible for fighting forest fires, including wildfires, and for managing rescue works. Since forest fires and wildfires are extremely specific, the Rescue

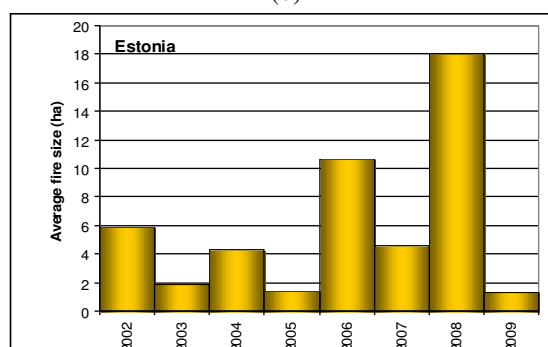
Board cooperates in its operations with the State Forest Management Centre, the Environmental Inspectorate, local governments, volunteer organisations and other institutions. Regional cooperation training sessions in fighting forest fires and wildfires are held for institutions engaged in the process.



(a)



(b)



(c)

Figure 16. Burnt areas (a), number of fires (b) and average fire size (c) in Estonia from 2002 to 2009.

### Fire causes

In 2009, 100% of forest fires were of human direct or indirect origin. 45% of the fires were caused by careless smoking and making fire.

### Operations of mutual assistance

No assistance was requested in 2009.

(Source: The Estonian Environment Information Centre, Estonia).

### 1.1.10. Finland

#### *Fire danger in the 2009 fire season*

Forest fires during the year 2009 in Finland settled at the normal level. The amount of wildfires decreased a little and the average size was almost the same as in previous years.

#### *Fire occurrence and affected surfaces*

In 2009 there were 2 841 wildfires in Finland and 1 004 of them were reported as forest fires. The total burned area was 1 614 ha, of which 595 ha was forest land. The average burned forest area per fire was 0.6 ha. The statistics from 1996 to 2009 are presented in Figure 15.

#### *Fire damages and injuries*

In Finland one person died in the forest fires in 2009 and six persons were injured, with minimal burns. Some of the fires caused damages to buildings and also some of the wildfires were caused by fires in buildings or vehicles. Economic losses caused by wildfires were approximately 2.2 million Euro, including also the value of the forest and buildings affected.

#### *Fire causes*

Human actions were the most common cause of wildfires, in 2 out of 3 fires, mainly by accident. The second most common cause was natural, with thunderstorms being reported as the cause for 75 of the fires. In 2009, the fire cause could not be found for a little more than 10% of the fires.

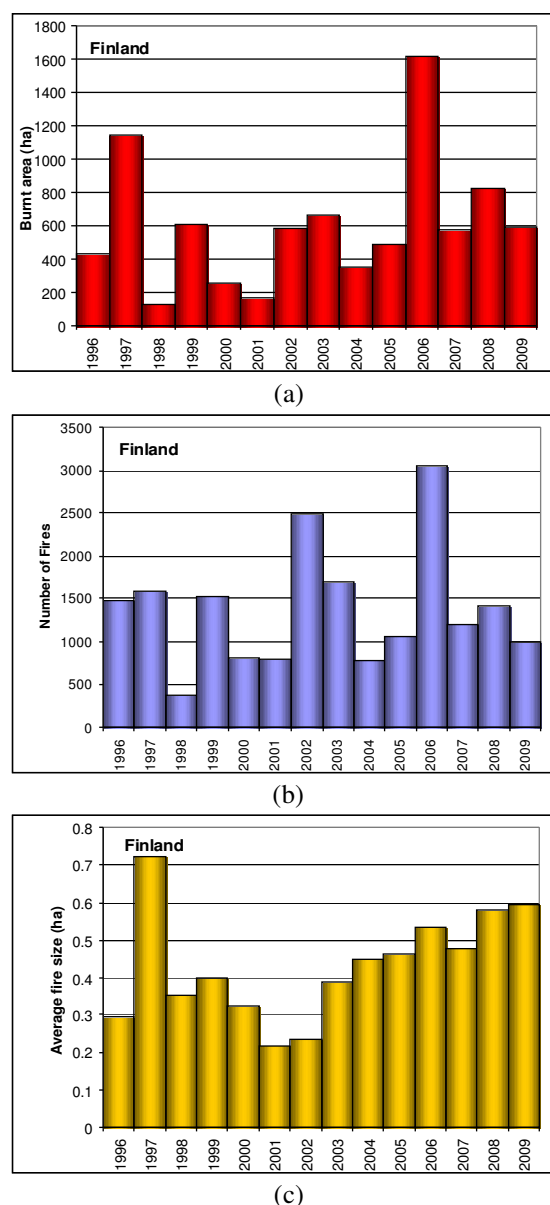


Figure 17. Burnt areas (a), number of fires (b) and average fire size (c) in Finland from 1996 to 2009.

Table 17 shows the number of wildland fires per year, including forest fires.

(Source: Ministry of Interior, Department for Rescue Services, Finland)



Table 17. Number of forest and wildland fires in Finland (1996-2009)

Year	Forest fires	Non forest fires	Total wildland fires
1996	1475	1983	3458
1997	1585	2327	3912
1998	370	1007	1377
1999	1528	2080	3608
2000	806	1302	2108
2001	796	1114	1910
2002	2489	2637	5126
2003	1707	2134	3841
2004	783	1415	2198
2005	1069	1562	2631
2006	3046	3244	6290
2007	1204	809	2013
2008	1415	1746	3161
2009	1004	1837	2841

### 1.1.11. Germany

#### *Fire occurrence and affected surfaces*

A total of 858 forest fires were reported in Germany in 2009, corresponding to a burnt area of 756.9 ha (384.5 ha in deciduous forests and 372.5 ha in coniferous forests). The majority of fires occurred in April (295 ignitions), followed by August (185) and May (136).

The trend of the burnt areas, number of fires and average fire size in Germany for the years 1991-2009 are shown in Figure 19.

#### *Fire causes and impacts*

The main causes of forest fires during 2008 are shown in Figure 18:

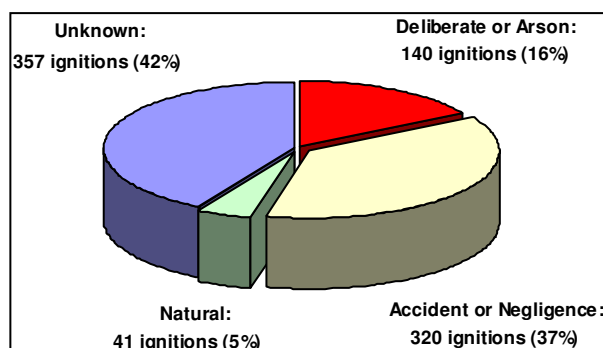
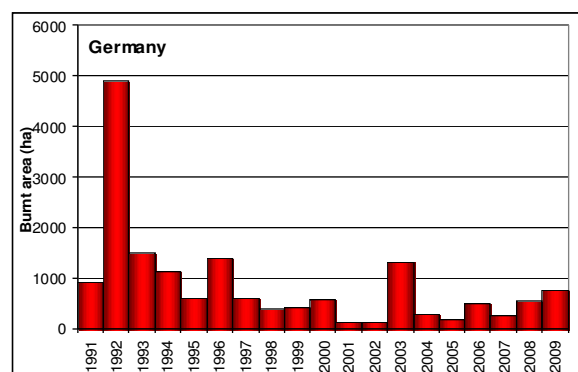
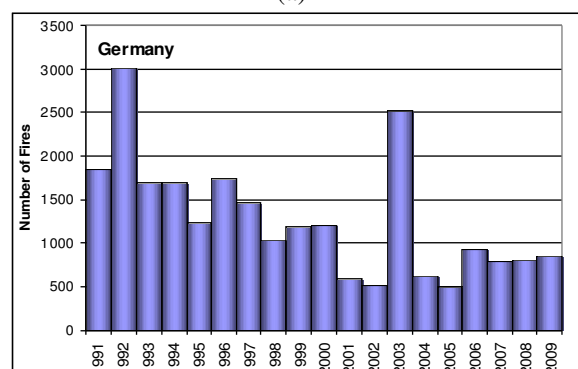


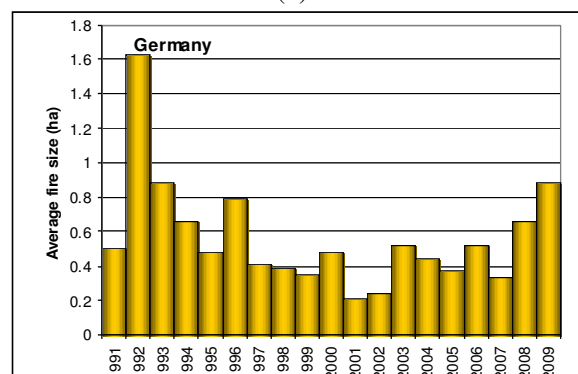
Figure 18. Causes of forest fires in 2009



(a)



(b)



(c)

Figure 19. Burnt areas (a), number of fires (b) and average fire size (c) in Germany from 1991 to 2009.

Table 18. Burnt area in total and by forest type, and total number of fires, Federal Republic of Germany, 2009

	<i>Burnt area (ha)</i>			<i>Number of fires</i>
	<i>Coniferous forest</i>	<i>Broadleaves forest</i>	<i>Total</i>	
<i>Baden-Württemberg</i>	3.6	4.8	8.4	31
<i>Bayern</i>	260.1	245.7	505.8	116
<i>Berlin</i>	5.2	0.2	5.4	11
<i>Brandenburg</i>	44.8	46.9	91.7	250
<i>Bremen</i>	0.0	0.0	0.0	0
<i>Hamburg</i>	0.0	0.0	0.0	0
<i>Hessen</i>	1.1	1.3	2.4	28
<i>Mecklenburg-Vorpommern</i>	4.8	3.1	7.9	40
<i>Niedersachsen</i>	35.0	16.0	50.9	156
<i>Nordrhein-Westfalen</i>	0.6	20.4	20.9	21
<i>Rheinland-Pfalz</i>	3.5	3.4	6.8	25
<i>Saarland</i>	0.0	0.0	0.0	0
<i>Sachsen</i>	5.5	12.1	17.6	85
<i>Sachsen-Anhalt</i>	7.7	28.6	36.3	78
<i>Schleswig-Holstein</i>	0.0	0.0	0.0	0
<i>Thüringen</i>	0.7	2.2	2.8	17
<b><i>Germany</i></b>	<b>372.5</b>	<b>384.5</b>	<b>756.9</b>	<b>858</b>

The most affected province (Land) in terms of burnt area was Bayern with 505.8 hectares resulting from 116 ignitions. Although both Brandenburg and Niedersachsen experienced more fires (250 and 156 respectively) the burnt areas were much lower, with 91.7 ha reported in Brandenburg and 50.9 ha in Niedersachsen. (See Table 18).

The economic damage caused by forest fires in 2009 is estimated to be 0.6 million Euro, a reduction of 36% on 2008. The yearly average from 1991 to 2009 is 2.2 million Euro. In 2009, 4.3 million Euro were spent on prevention measures and surveillance activities.

*(Source: Federal Agency for Agriculture and Food, Germany)*

### 1.1.12. Latvia

#### *Fire danger in the 2009 fire season*

In 2009 the forest flammable period was set from April 27 and continued until September 21. The majority of fires occurred in spring and late summer.

#### *Fire occurrence and affected surfaces*

In 2009 a total of 823 forest fires were detected and extinguished, during which 646 hectares were burned. Of these, 352 hectares of forest, 127 hectares of young stands and 167 hectares of other wooded land were affected.

In 90% of the cases the fires were detected and extinguished before the burned area had reached 1 hectare.

Traditionally, the highest number of forest fires was in the vicinity of the two Latvia's biggest cities – Riga and Daugavpils (400 fires, 169 ha affected area, and 158 fires, 110 ha, respectively).

The largest forest fire took place in the NATURA 2000 nature reserve "Ance swamps and forests", in the result of which 102.3 hectares of wooded forest land, including 19 ha of forest, were affected.

Figure 21 shows loci and size of forest fires in 2009.

#### *Fire fighting means*

In 2009 the State forest service with the support of EU structural funds announced a tender for reconstruction projects of 40 fire lookout towers, purchased 192 portable radio sets and 115 GPS receivers for accurate surveying of forest fires.

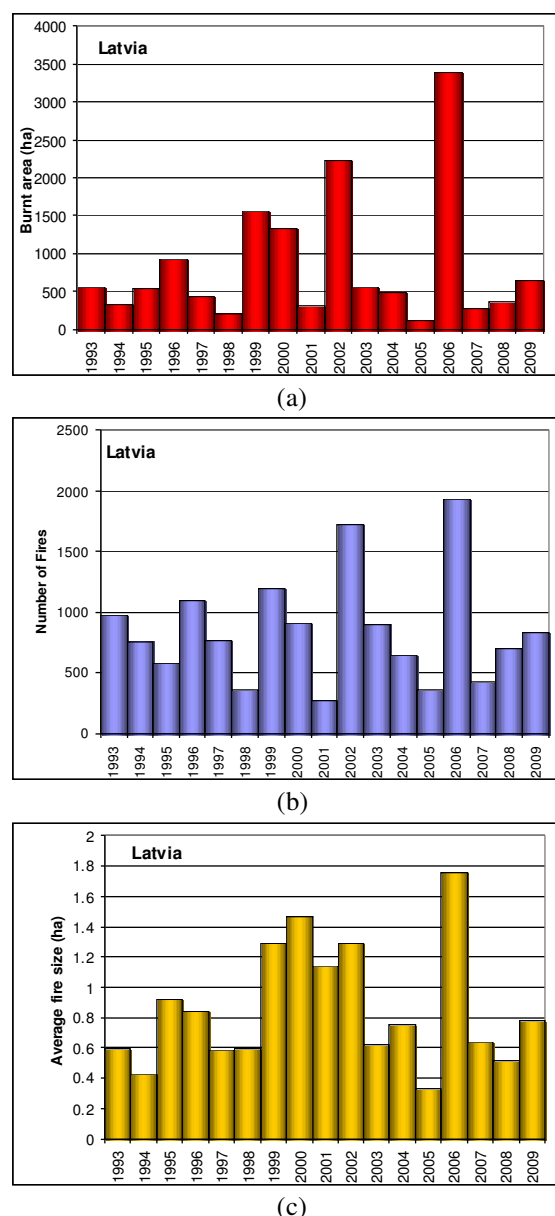


Figure 20. Burnt areas (a), number of fires (b) and average fire size (c) in Latvia from 1993 to 2009.

(Source: State Forest Service, forest and environment protection division, Latvia)

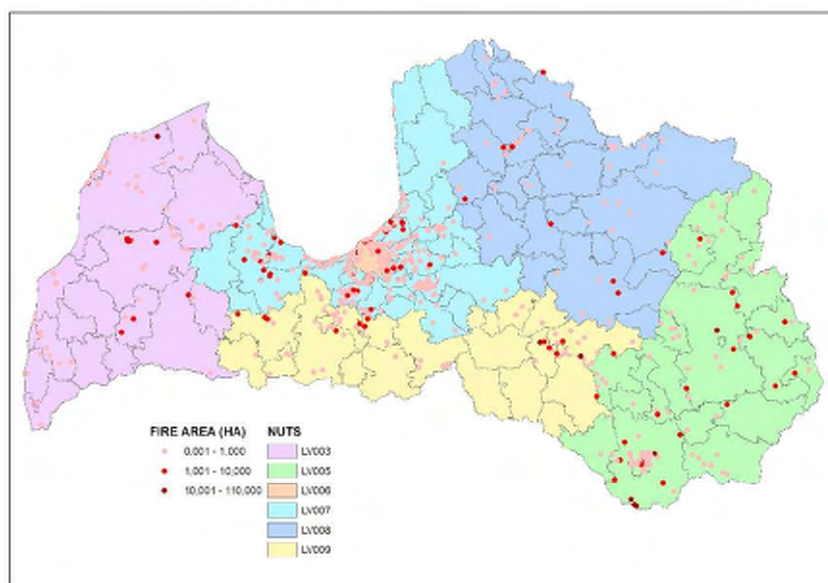


Figure 21. Map of forest fire locations in Latvia in 2009

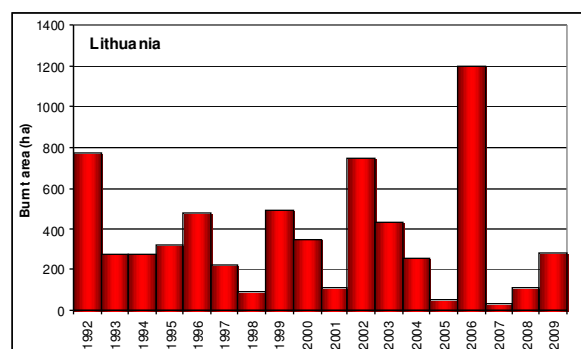
### 1.1.13. Lithuania

In 2009, according to the data of the Directorate General of State Forests, 471 forest fires occurred and damaged 286.8 ha of forest. Compared with the previous 17 years both the number of the fires and the total burnt forest land area were low. The average burnt area was approx 0.61 ha. The yearly trends in terms of number of fires and burnt area during the last 18 years in Lithuania are shown in Figure 22.

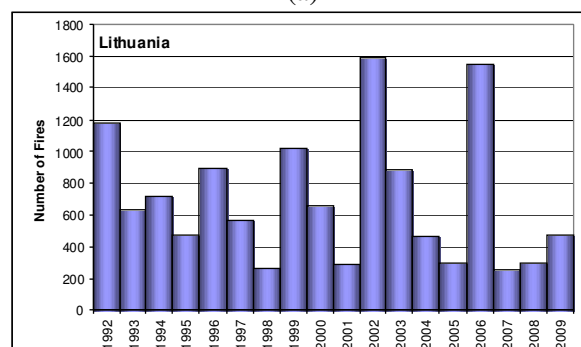
#### *Injuries and loss of human lives*

No casualties were reported in Lithuania during the fire season of 2009.

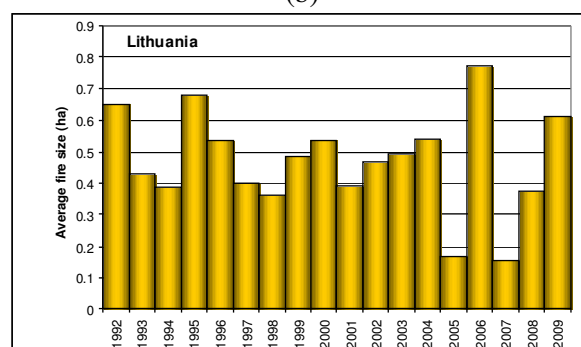
(Source: Ministry of Environment, Forests Department, Lithuania)



(a)



(b)



(c)

Figure 22. Burnt areas (a), number of fires (b) and average fire size (c) in Lithuania from 1992 to 2009.

### 1.1.14. Poland

#### *Fire danger in the 2009 fire season*

The seasonal nature of the occurrence of fires is strictly related to the weather conditions. The diagrams (Figure 23 - Figure 26) show the variations of air temperatures, precipitation, pine (*Pinus sylvestris* L.) litter moisture and the national degree of forest fire danger risk (NDFFDR) in the 2009 fire season. They also present the number of fire outbreaks. The mean monthly air temperatures in 2009 were much higher (by more than 2 °C) than the long-term mean values in the entire country in April and in the middle of September. The higher than standard temperatures (by 0.5-2.0 °C) occurred in the 1<sup>st</sup> part of May throughout the country, at the end of June, in July and at the beginning and end of August and September in most of the country.

The precipitation levels during the fire season in 2009 varied both in terms of the occurrence of precipitation events in time and their geographical distribution. Precipitation totals varied between 0.4 and 229 mm in the individual months and took the values of long-term standards from 1 to 246%. On average, the largest number of rainy days was recorded in June and the lowest number in April. The highest precipitation level was recorded in June (on average, 161% of the long-term standard, corresponding to the precipitation level of 125 mm). Precipitation levels which were either substantially lower (0-24%) or lower (25-74%) than the long-term standards occurred in April throughout the country; in most areas, also in the middle of September and in the first 20 days of August. The mean litter moisture values at the national scale varied between 10 and 55%, exceeding 30% in June and July. The lowest litter moisture value occurred in April (lower by 11% than the long-term mean value). Low values (< 30%) also persisted in August and September and partly in May and July. The mean value for the season was similar to the long-term values.

The highest forest fire danger risk (which was also much higher than its long-term level in 2001-2005) occurred in April 2009 (NDFFDR = 2.5) and in May at 1 p.m. it was higher than the long-term level by 0.3. In June it was lower by 0.6 and was close to the long-term level in the other months. The mean national degree of forest fire danger risk (NDFFDR = 1.7) was close to the value described as “large danger” (corresponding to “2” on the forecast scale). In the season it was

higher by 0.1 compared with the long-term period 2001-2005.

The percentage share of the occurrence of the third degree of forest fire danger risk for the fire season was 26% on average, just as in the long-term period. In April it reached its maximum value of 64%, i.e. it was greater by a factor of more than two compared with the period 2001-2005; in May (24%) it was the same as the long-term mean value. In turn, in June it was only 4-5% and in July (12%) it was twice as low as in the long-term period. In August it was slightly higher than the long-term mean value.

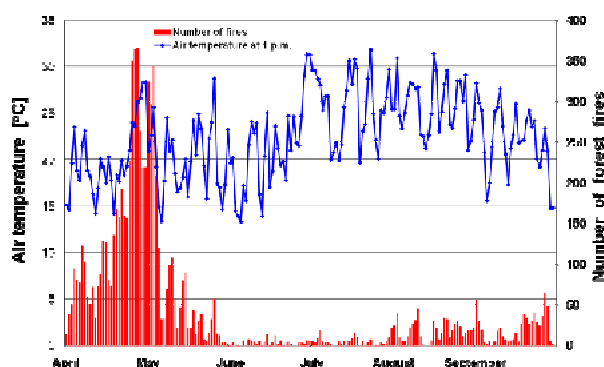


Figure 23. Air temperatures and numbers of forest fires in fire season 2009

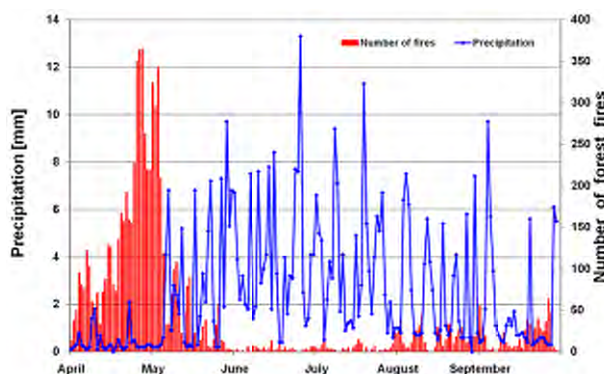


Figure 24. Precipitation and numbers of forest fires in fire season 2009

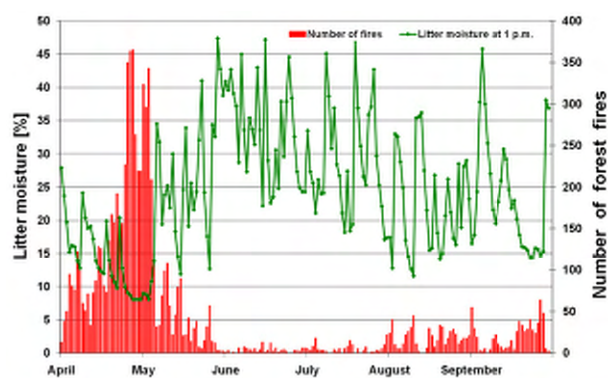


Figure 25. Litter moisture and numbers of forest fires in fire season 2009

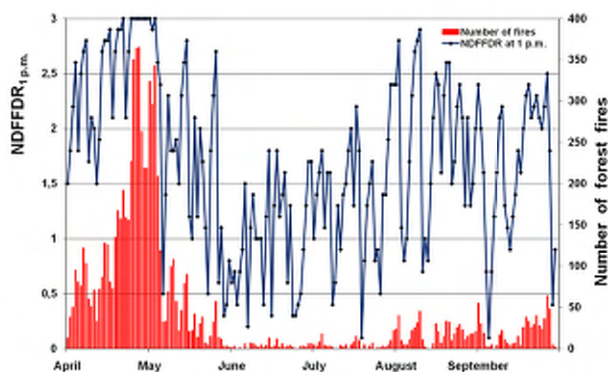


Figure 26. The National Degree of Forest Fire Danger Risk and numbers of forest fires in fire season 2009

#### Fire occurrence and affected surfaces

In 2009 in Poland, a total of 9 161 fires broke out affecting a surface area of 4 400 ha (Table 19 and Figure 28). Compared with the long-term mean value in the 1990s, the number of fires was larger by almost 1 500. The greatest proportion of fires occurred during April (53%, i.e. 4 665 fires), and this number was greater than in the period 2001-2005. April was followed by May (29%), September (8%) and August (7%). The lowest number of fires in the fire season occurred in June (1%, i.e. 113, lower by a factor of almost 12 than the average number in the long-term period) and it was 2% in July (Figure 27). The total number of fires in early spring (April-May) was distinctly higher (79%) than in the previous year (24%) and the long-term mean value (40%) in the period 2001-2005. 98% of fires broke out in the fire season, i.e. more than in the long-term period (88%).

The largest number of fires in 2009 (22%), i.e. fewer by 1% than in 2008, occurred in Mazowieckie Province (2 027), Śląskie and Łódzkie Provinces (each 9%) and Świętokrzyskie Province (8%). More than 500 fires were recorded in Lubuskie Province (666), Wielkopolskie Province (632) and Kujawsko-Pomorskie Province (584). The lowest number of forest fires

occurred in Małopolskie Province (139). The largest burnt forest areas were recorded in Mazowieckie Province (987 ha), Podlaskie Province (560 ha) and Śląskie Province (521 ha), i.e. 47% of the total, and in Świętokrzyskie Province (470 ha), Łódzkie Province (376 ha), Podkarpackie Province (284 ha) and Dolnośląskie Province (256 ha), with the smallest areas in Opolskie Province (44 ha), Małopolskie Province (48 ha), Zachodniopomorskie Province (52 ha) and Lubuskie Province (63 ha). These data are illustrated in Figure 29-Figure 31.

Small forest fires, i.e. with a surface area of less than 1 ha, represented 88% of all the forest fires in 2009 (Figure 32), with the burnt area amounting to 31%. The largest share of the burnt area (52%) was recorded for fires of more than 1 ha and less than 10 ha, with their number representing 12%.

Table 19. Forest fire database for Poland in the period 1994-2009

Year	Number of forest fires	Burned area (ha)	Forest fires average area (ha)
1994	10 710	9 171	0.86
1995	7 681	5 306	0.69
1996	7 924	14 120	1.78
1997	6 818	6 598	0.97
1998	6 166	4 019	0.65
1999	9 820	8 307	0.85
2000	12 428	7 013	0.56
2001	4 480	3 429	0.77
2002	10 101	5 593	0.55
2003	17 088	28 554	1.67
2004	7 219	4 338	0.60
2005	12 803	7 387	0.58
2006	11 828	5 912	0.50
2007	8 302	2 841	0.34
2008	9 090	3 027	0.33
2009	9 161	4 400	0.48
<i>Yearly Average in the Period</i>			
1996-2000	8 631	8 011	0.93
2001-2005	10 338	9 860	0.95

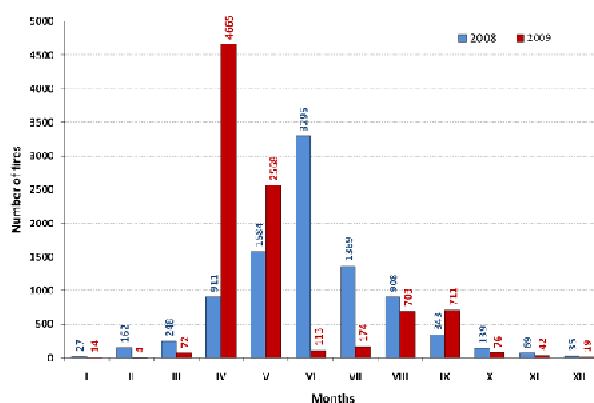


Figure 27. Distribution of number of forest fires by months in 2008 and 2009 in Poland



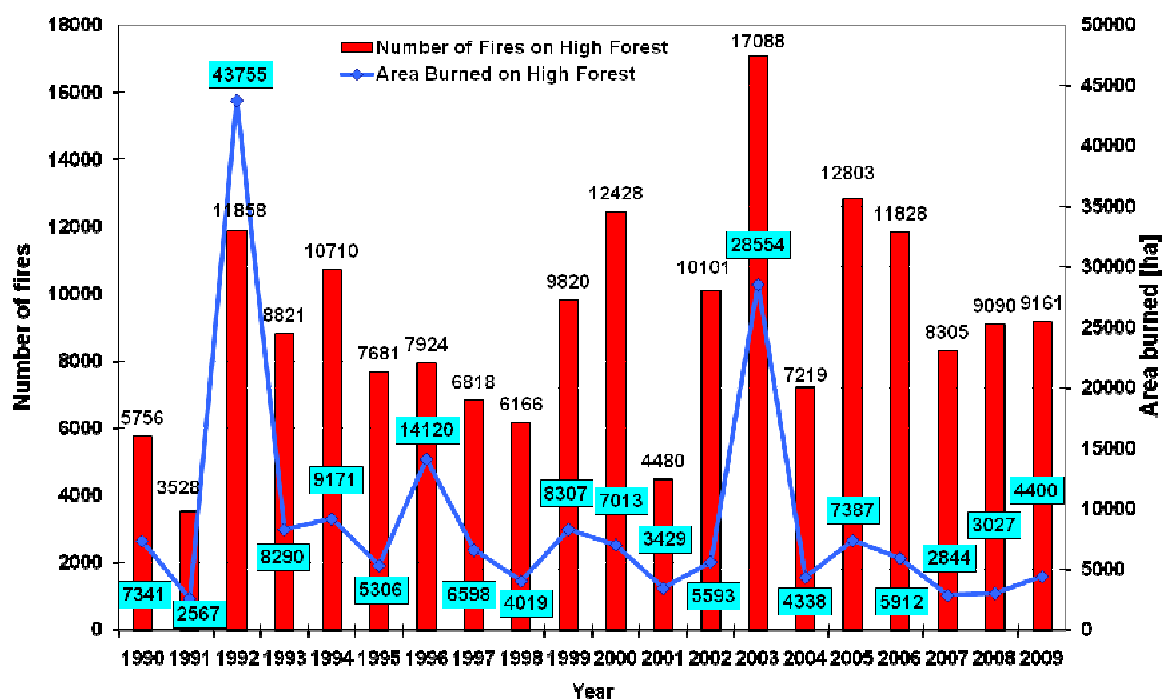


Figure 28. Total number of fires on high forest and area burned in Poland in the period 1990-2009

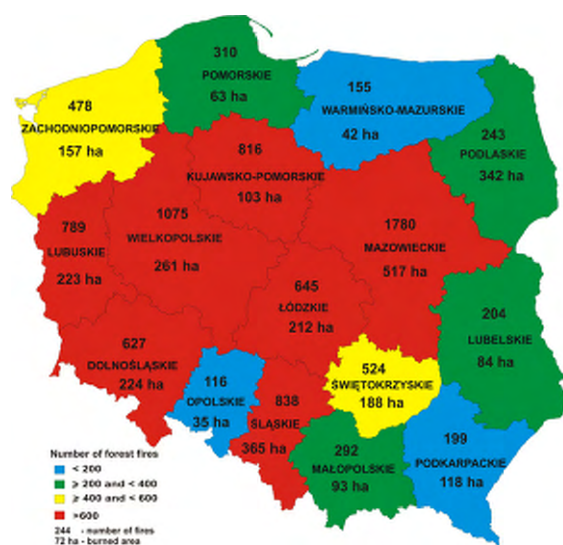


Figure 29. Number of forest fires and burned areas by provinces of Poland in 2008

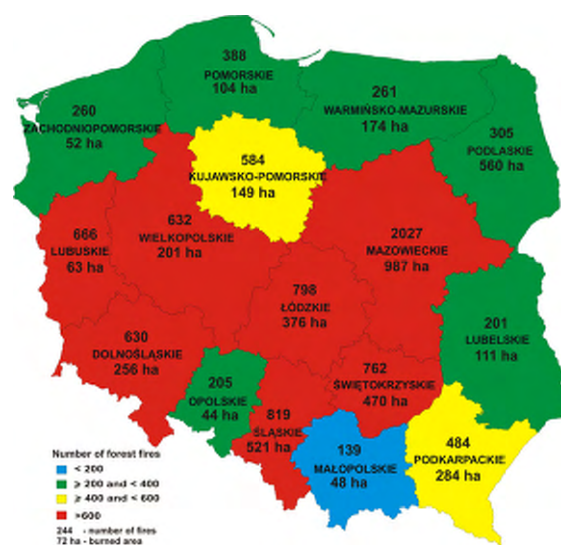


Figure 30. Number of forest fires and burned areas by provinces of Poland in 2009

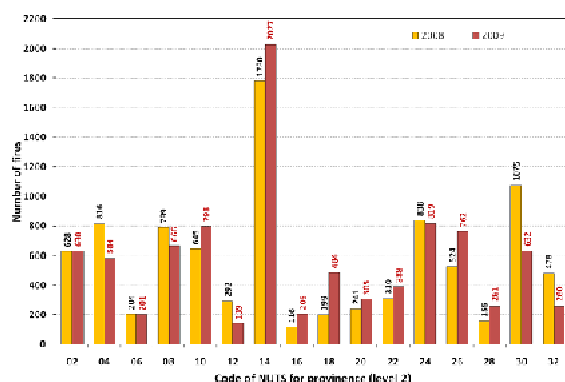


Figure 31. Distribution of the number of forest fires by province (NUTS level 2) in 2008 and 2009 in Poland

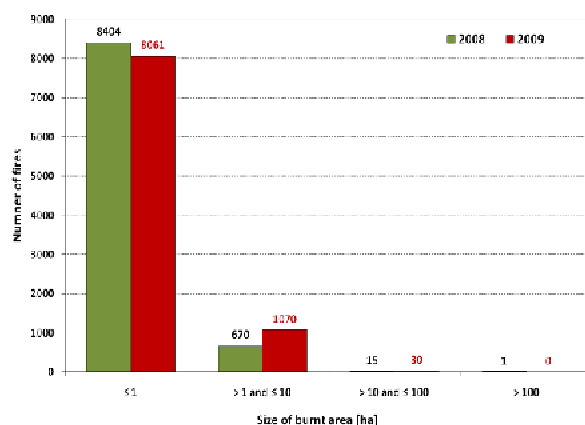


Figure 32. Distribution of the number of forest fires by size of burnt area in the years 2008 and 2009 in Poland

### Fire causes

Human activity was the main cause of forest fires, specifically arson which represented almost half of the fires (45%), followed by carelessness (38%) and unknown causes (more than 16%) (Figure 33).

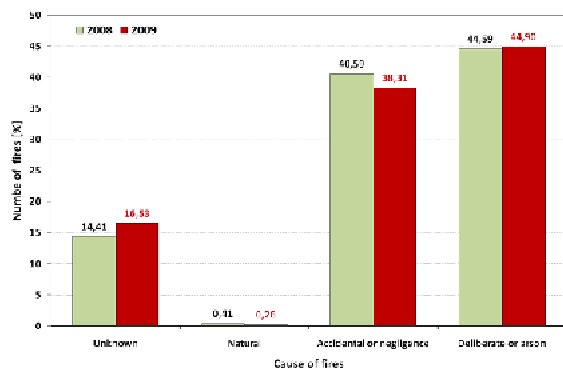
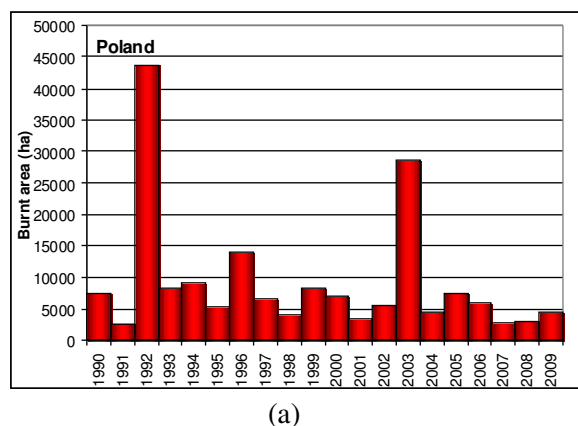
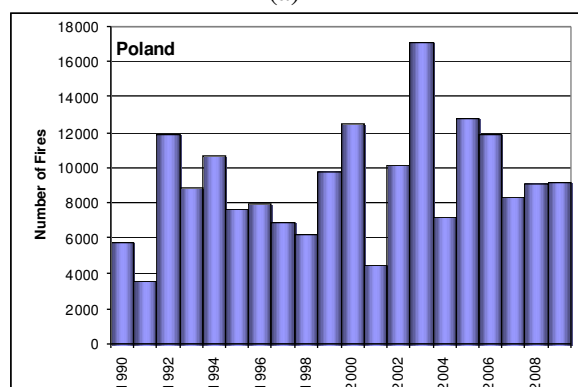


Figure 33. Distribution of the number of forest fires by causes in 2008 and 2009 in Poland

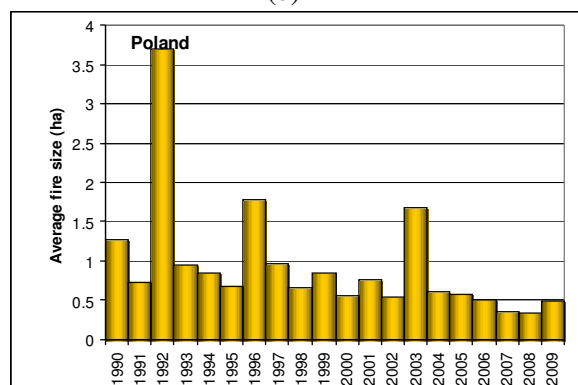
The burnt area, number of fires and average fire size for the years 1990 – 2009 are shown in Figure 34.



(a)



(b)



(c)

Figure 34. Burnt areas (a), number of fires (b) and average fire size (c) in Poland from 1990 to 2009.



### *Fire fighting means and information campaigns*

In 2009, as part of information and promotion activities, the following measures in the State Forests National Forest Holding (State Forests NFH) were taken:

9 700 lectures in schools and youth camps,

about 6 information boards were erected,

a total of about 1 000 communications were provided in the mass media on fire danger and the principles of safe behaviour in forests,

120 000 posters, information leaflets and calendars related to forest fires were disseminated,

241 competitions on fire protection were organised for children and young people.

In forest areas, works were carried out to prevent the conditions for fire outbreaks and to reduce their spread, by repairing 6 228 km of fuel breaks and building 58 km of new fuel breaks; in addition, forests were cleaned over a surface area of 25 500 ha, by reducing the quantity of inflammable biomass.

The observation system of the State Forests NFH consisted of:

647 fire protection lookout points, including 147 equipped with a system of TV cameras,

10 patrol airplanes.

The effectiveness rate of fire detection by fire protection lookout points was 39%, airplanes detected 2% of fires and civilians notified of 51%. The other 8% of fires were detected by fire protection patrols.

The communication and alarm network in the State Forests NFH consisted of: 7 886 radio-telephones, including 1 382 base sets, 3 131 mobile sets and 3 373 hand held sets.

Water supply for fire suppression purposes was provided by 12 558 water supply points, including 4 341 natural points and 2 510 artificial ones. Moreover, water was supplied by about 5 000 hydrants located in the vicinity of forests.

The State Forests NFH had its own equipment, consisting of:

28 fire suppression airplanes and 7 helicopters,

365 patrol and fire suppression vehicles,

17 medium vehicles,

4 heavy vehicles,

268 portable pumps.

These means were used to extinguish 4% of all the fires, whereas the other fires were suppressed by units of the State Fire Service and voluntary fire brigades.

In 2009, the fire protection costs incurred by the State Forests NFH amounted to 62 million PLN.

Information on Poland's National Forest Fire Information System can be found on [https://bazapozarow.ibles.pl/ibl\\_ppoz/faces/index.jsp](https://bazapozarow.ibles.pl/ibl_ppoz/faces/index.jsp) and Poland's Forest Fire Danger Map, which is updated daily from April to September (at 9 a.m. and at 1 p.m.) is shown on <http://bazapozarow.ibles.pl/zagrozenie/>

*(Source: Forest Research Institute, Forest Fire Protection Department,, Poland)*

### 1.1.15. Romania

In Romania, the summer of 2009 was warmer than in the reference period (1961-1990). The precipitation recorded a deficit in most of the country (Figure 36, Figure 38 and Figure 39) at the beginning of the year, especially in the summer period. The increased values of high temperatures (Figure 37), with daily values of  $\Sigma T_{\max}$   $32^{\circ}\text{C}$ , determined also the periodic exceeding of the thermal temperature-humidity comfort index ITU critical value, which resulted in tropical nights ( $\Sigma T_{\min}$   $17^{\circ}\text{C}$ ).

Table 20. Severe drought years in Romania since 1901

Decade	Severe drought years
1901-1910	1907-1908
1911-1920	1917-1918
1921-1930	1923-1924, 1927-1928
1931-1940	1934-1935
1941-1950	1945-1946, 1947-1948, 1949-1950
1951-1960	1952-1953
1961-1970	1962-1963, 1964-1965
1971-1980	1973-1974, 1975-1976
1981-1990	1982-1983, 1985-1986, 1987-1988
1991-2000	1992-1993, 1999-2000
2001-2010	2000-2001, 2001-2002, 2002-2003, 2006-2007, 2008-2009

At the level of the whole country the thermal regime in 2009 was above the climatological norm. The positive deviation to the normal values ranged between  $0.70^{\circ}\text{C}$  in May, to  $1.90^{\circ}\text{C}$  in November, with March being the only month when the average monthly temperature was climatologically normal (Figure 35).

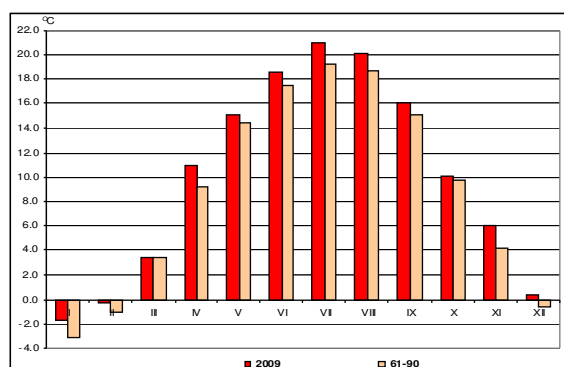


Figure 35. Average monthly temperature in Romania during 2009, comparatively with the climatological norm (1961-1990)

The precipitation regime during 2009 was normal, and the average quantity falling at the level of the whole country (674.0 mm), compared with the climatological norm (637.9 mm), making the year's total 5.7% greater than the average. The extra rain falling in January, February, March, June, October, November and December compensated for the precipitation deficit in April, May, July, August and September. During 2009, the average quantities at the level of the whole country averaged from 15.8 mm in April, when the climatological norm is 51.5 mm, to 104.1 mm in June, with the normal quantity of 89.2 mm (Figure 39, Table 21).



Figure 36. Precipitations recorded between September 2008 and May 2009

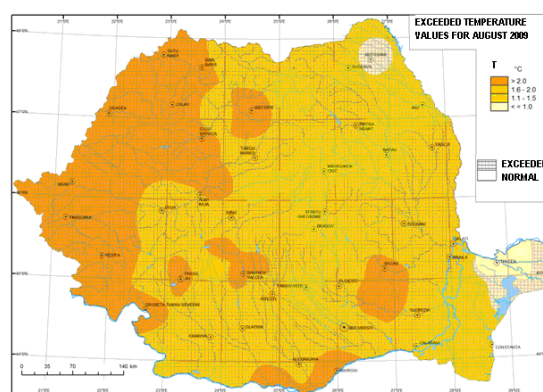


Figure 37. The deviation of the monthly average temperature in August 2009 comparing with the multiannual average temperature (1961-1990).

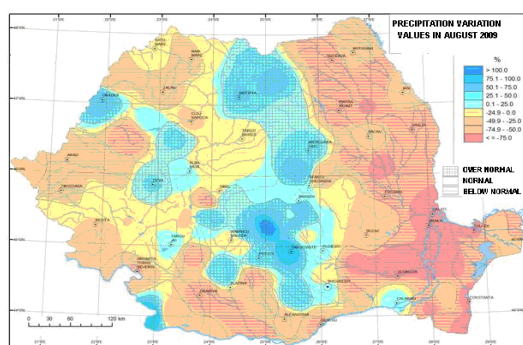


Figure 38. The deviation of the total monthly precipitations in August 2009 comparing with the multiannual average values (1961-1990).

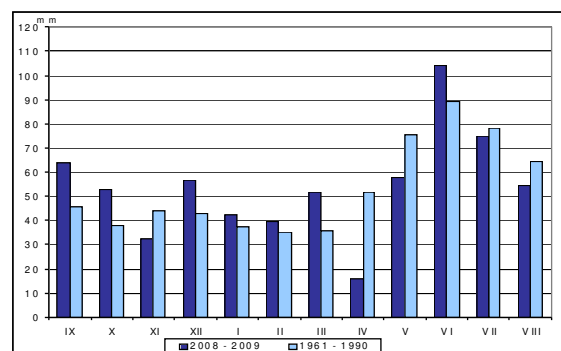


Figure 39. The monthly average precipitations recorded during 2008-2009, compared with the normal climatological values (1961-1990)

Table 21. Monthly average precipitations during 2008-2009, compared with the normal values (1961-1990)

Years	IX	X	XI	XII	I	II	III	IV	V	VI	VII	VIII
2008-2009	63.6	52.9	<b>32.7</b>	56.7	42.3	39.7	51.9	<b>15.8</b>	<b>58.0</b>	104.1	<b>75.0</b>	<b>54.2</b>
1961-1990	45.5	38.1	43.9	43.2	37.2	35.4	35.6	51.5	75.7	89.2	78.2	64.4

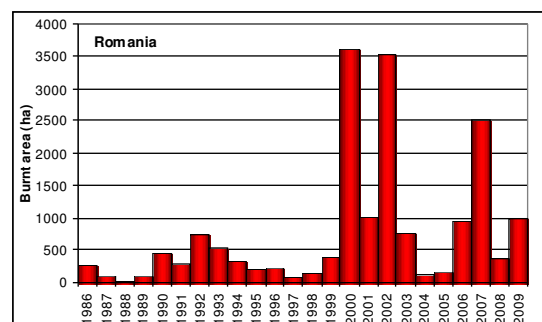
### *Fire occurrence and affected surfaces*

Compared to the year 1999, we can notice that the number of fires and the affected areas, strongly increased in 2009 (Figure 40). This phenomenon is related with climate change (drought and low precipitation), the weather becoming warmer and warmer, large surfaces being affected by drought every year. Other causes of increased number of forest fires are the following issues:

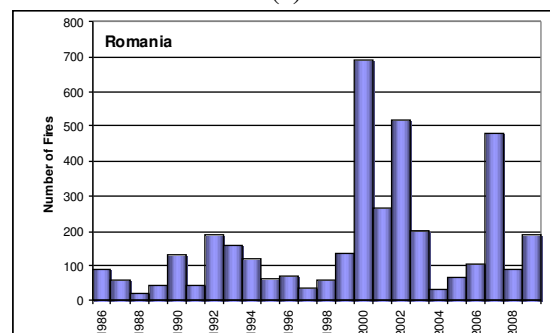
- Forest management is difficult because of forest fragmentation, which results in thousands of owners (no.:828.138, source: [www.madr.ro](http://www.madr.ro), [www.mmediu.ro](http://www.mmediu.ro));
- Agricultural practices - unsupervised fire in areas next to forests (private green crops);
- Two new causes (electric lines and railways) of forest fires, which were not found in the previous reports.

### *Fire damages and injuries*

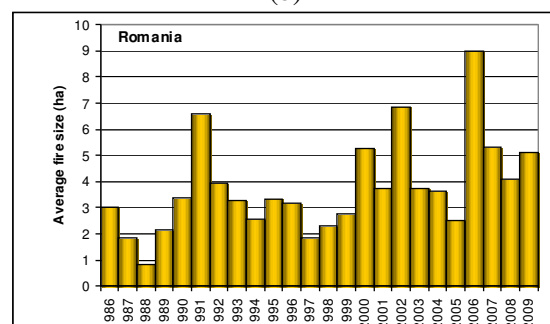
The economical losses due to forest fires were not very high, because the population and the authorities intervened for extinguishing the forest fires at an early phase. The low economical losses are also determined by the geographic condition of our country, and also by the composition of the forests, because the damages are calculated only for substitution forest value and timber values, and also because young forests were the most affected by fires (Figure 41).



(a)



(b)



(c)

Figure 40. Burnt area (a), number of fires (b) and average fire size (c) in Romania from 1986 to 2009

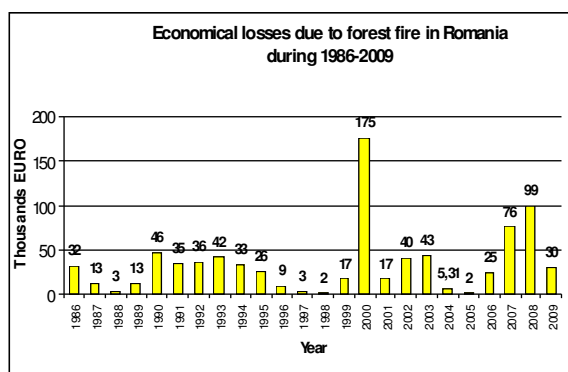


Figure 41. Economic losses due to forest fires in Romania from 1986 to 2009

### *Fire fighting means and information campaigns*

The prevention and extinguish measures are assured by the Ministry of Agriculture and by the Ministry of Administration and Interior, with their structures (ROMSILVA, Forest Inspectorates (ITRSV), Emergency Situation Inspectorate (ISU) and county and local responsible authorities). A collaboration protocol is also established between these structures at both national and at county level.

ROMSILVA is responsible for the national (3 467 000 ha) and private forests (1 126 000 ha) that are under its administration and ITRSV is responsible for the private forests that are administrated by private structures (private forest districts) (1 807 000 ha).

(source: [www.madr.ro](http://www.madr.ro), [www.mmediu.ro](http://www.mmediu.ro)).

The main legal base is assured by Law 46/2008, also called The Forest Code.

### *Fire causes*

During 2009, the major causes of forest fires, as in the recent years, were represented by the agricultural practices of the people from rural areas, mainly corresponding to the cleaning of fields by uncontrolled ignition of dried plant wastes (Figure 42).

Romania's proposal for classifying the causes of forest fires:

1. Unknown causes
2. Known causes
  - 2.1 Natural causes
  - 2.2 Human causes
    - 2.2.1 Criminal causes
    - 2.2.2 Negligence causes
      - 2.2.2.1 Agricultural practices
      - 2.2.2.2 Pathways
      - 2.2.2.3 Public causes
      - 2.2.2.4 Electric lines
      - 2.2.2.5 Railways

(Source: Ministry of Environment and Forests  
University of Agricultural Science and Veterinary Medicine  
National Environmental Protection Agency,  
Romania)

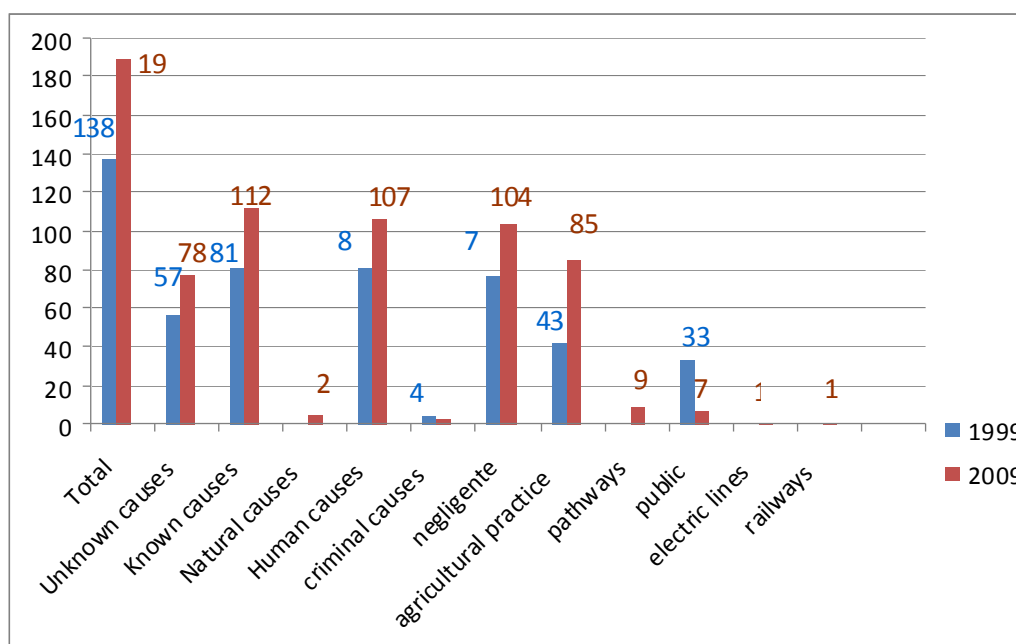


Figure 42. Comparison of forest fires causes in Romania between 1999 and 2009

### 1.1.16. Slovak Republic

#### *Fire danger in the 2009 fire season*

In Slovakia the fire season 2009 was an average one. The number of fires was influenced substantially by the weather conditions, the number of days without rain, and the human factor (negligence, particularly) in spring and summer.

#### *Fire occurrence and affected surfaces*

The total number of 347 forest fires was reported in Slovakia in 2009. The total burned area was 509.66 ha. The average burned forest area per fire was 1.5 ha. The largest recorded fire started 28<sup>th</sup> April and ended 30<sup>th</sup> April 2009 in the district of Poprad (Kežmarské žľaby, High Tatras). In this event, about 150 hectares of forest were burned.

The burnt areas, number of fires and average fire size for years 1999–2009 are shown in Figure 43.

#### *Injuries and loss of human lives*

One injury was reported in Slovakia during the fire season of 2009.

#### *Fire causes*

Forest fire causes for the years 2002–2009 are shown in Table 22.

(Processed: National Forest Centre - Forest Research Institute Zvolen, Slovak Republic; Source: Institute for Fires and Expertise of the Ministry of Interior of Slovak Republic)

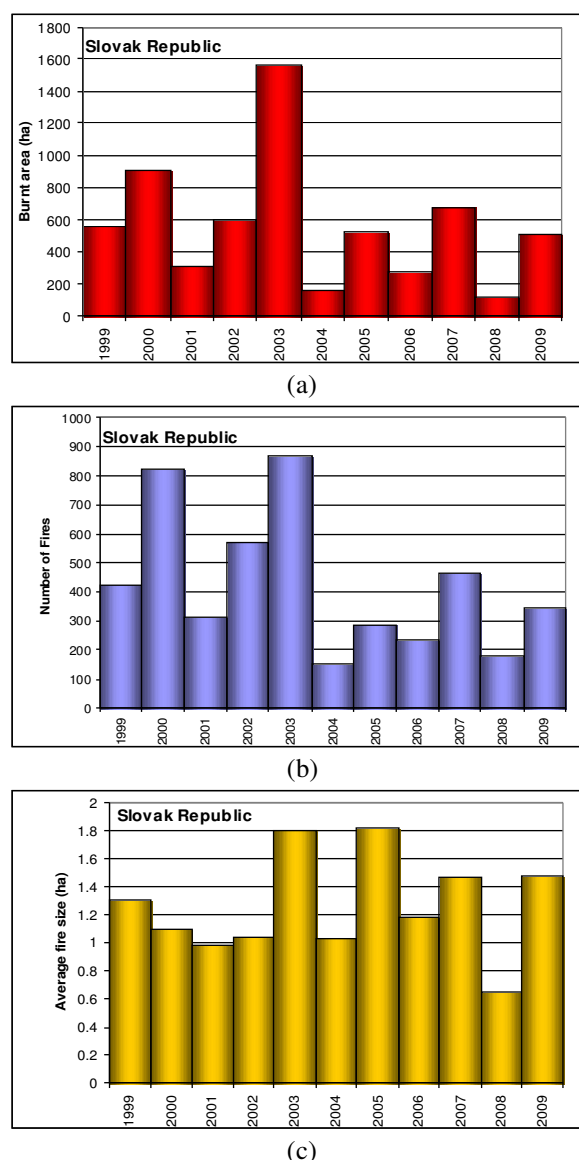


Figure 43. Burnt areas (a), number of fires (b) and average fire size (c) in the Slovak Republic from 1999 to 2009.

Table 22. Fire causes in Slovak Republic in 2002 – 2008 (number of forest fires).

	Year	2002	2003	2004	2005	2006	2007	2008	2009
<b>A. Basic information:</b>	Total fires	570	852	155	286	237	463	182	347
<b>Known causes (Human)</b>	(a) Arson	18	31	8	7	8	11	7	18
	(b) Negligence (see also B below)	525	780	138	261	201	416	154	286
<b>Known causes (Natural)</b>	Lightning	4	3	1	2	3	6	1	3
<b>Unknown causes</b>	Unknown	23	38	8	16	25	26	20	40
<b>B. Supplementary information: Total negligence</b>	1. Agricultural operations	239	280	38	91	22	110	25	51
	2. Logging and forest operations	4	2	2		10	23	19	52
	3. Other industrial activities	13	12	0	1	3	2	20	12
	4. Communications (railways, electricity lines, etc.)	2	3	1	2	2	3	3	7
	5. General public (campers, other visitors, children)	263	477	96	163	163	278	81	161
	6. Other (military, etc.)	4	6	1	4	1	0	6	3

### 1.1.17. Slovenia

In 2009, according to the data of the Forest Service, 120 forest fires were reported, with a total burned area of 177.08 ha, of which 73.41 were of forest land. Although the number of fires and the total burned area were higher than 2008, they were both relatively low compared with the previous 6 years. The average burnt area was approximately 1.48 ha. The yearly trends in terms of number of fires and burnt area during the last 8 years in Slovenia are shown in Figure 44. The number of days reported as high risk for forest fires are presented in Figure 44.

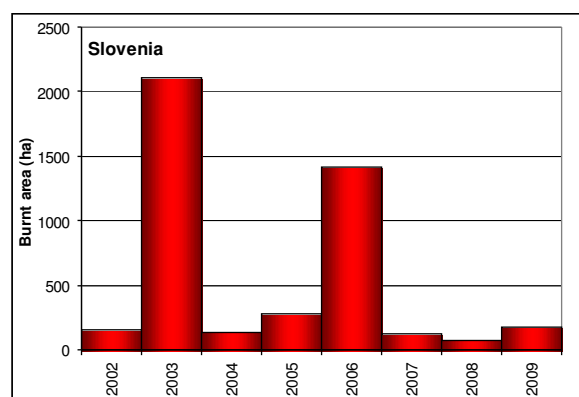
Table 23. Fire causes in Slovenia in 2009 (number of forest fires and burnt area).

<i>Fire Cause</i>	<i>Number</i>	<i>Burnt area (ha)</i>
Arson	12	2.00
Negligence	62	103.80
Natural (lightning)	8	43.88
Unknown causes	38	27.40
<b>Total</b>	<b>120</b>	<b>177.08</b>
<b>Negligence subcategories:</b>		
Agricultural operations	26	27.97
Logging and forest operations	2	1.30
Other industrial activities	0	0.00
Communications (railways, power line etc.)	25	61.74
General public (campers, children etc.)	5	3.66
Other (military, etc.)	4	9.13

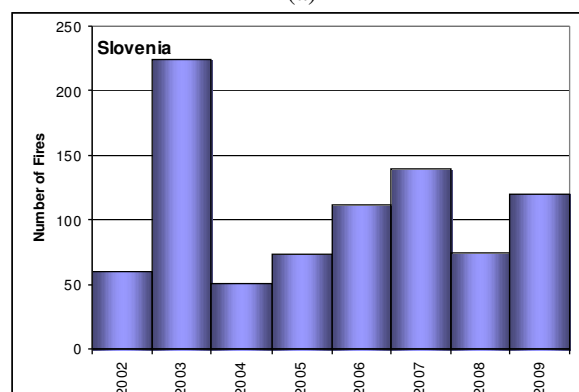
The majority of fires (just over 50%) were caused by negligence (Table 23).

#### *Injuries and loss of human lives*

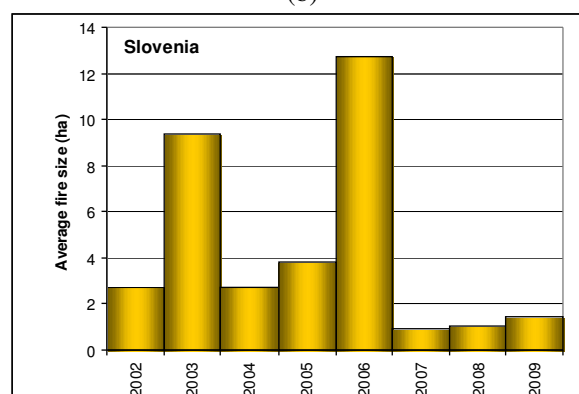
No casualties were reported in Slovenia during the fire season of 2009.



(a)



(b)



(c)

Figure 44. Burnt areas (a), number of fires (b) and average fire size (c) in Slovenia from 2002 to 2009

(Source: Forest Service, Slovenia)



Table 24. Number of fires and burned area by forest management unit in Slovenia in 2009

Forest management unit	Number of fires					Burned area (ha)			
	<1 ha	>=1 ha	>100 ha	>500 ha	Total	Wooded area	Bushes	Non wooded area	Total
<i>Tolmin</i>	2	1	0	0	3	0.47	0.00	2.50	2.97
<i>Bled</i>	0	1	0	0	1	2.00	0.00	0.00	2.00
<i>Kranj</i>	1	0	0	0	1	0.15	0.00	0.00	0.15
<i>Ljubljana</i>	0	2	0	0	2	1.70	0.00	1.60	3.30
<i>Postojna</i>	1	2	0	0	3	0.00	1.40	9.65	11.05
<i>Kočevje</i>	0	0	0	0	0	0.00	0.00	0.00	0.00
<i>Novo mesto</i>	0	1	0	0	1	0.00	1.15	0.00	1.15
<i>Brežice</i>	0	0	0	0	0	0.00	0.00	0.00	0.00
<i>Celje</i>	9	4	0	0	13	7.02	0.01	0.00	7.03
<i>Nazarje</i>	0	0	0	0	0	0.00	0.00	0.00	0.00
<i>Slovenj Gradec</i>	1	0	0	0	1	0.40	0.00	0.00	0.40
<i>Maribor</i>	3	0	0	0	3	0.50	0.25	0.00	0.75
<i>Murska Sobota</i>	1	0	0	0	1	0.00	0.00	0.05	0.05
<i>Sežana</i>	67	24	0	0	91	61.17	15.16	71.90	148.23
<b>Total</b>	<b>85</b>	<b>35</b>	<b>0</b>	<b>0</b>	<b>120</b>	<b>73.41</b>	<b>17.97</b>	<b>85.70</b>	<b>177.08</b>

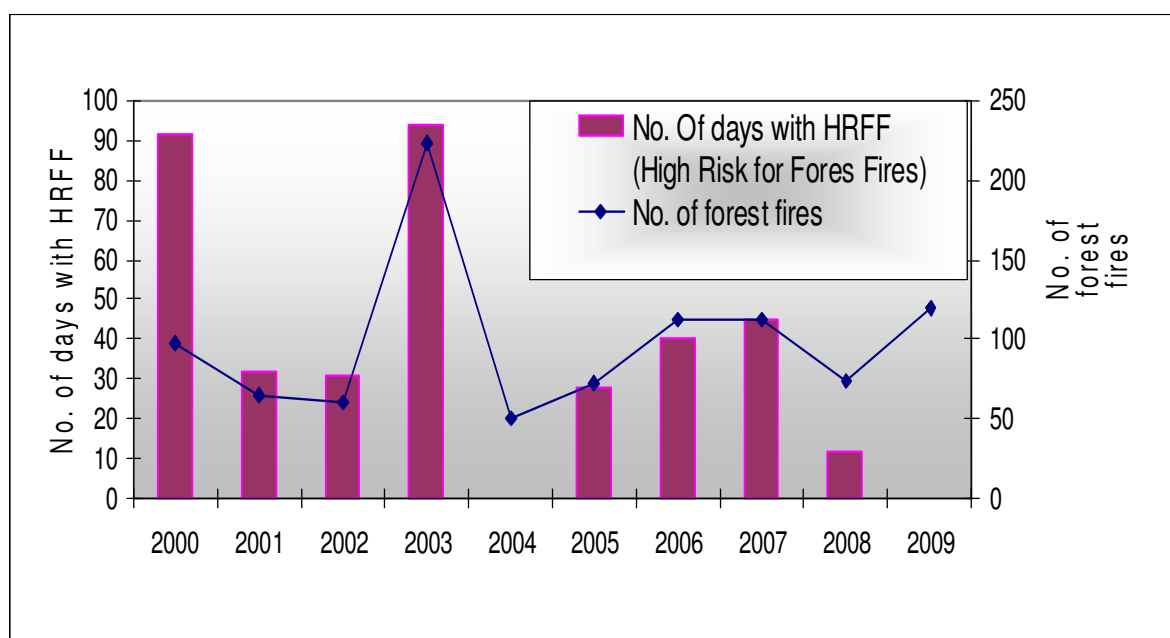


Figure 45: Number of days reported as high risk for forest fires

### 1.1.18. Sweden

#### *Fire danger in the 2009 fire season*

The fire danger was high in the beginning of the season in some parts of the country. This year was rather dry in the spring and early summer and there was a lot of rain at the end of the summer. There were fewer fires and less burned area recorded in the 2009 fire season than the mean of the last 13 years.

#### *Fire occurrence and affected surfaces*

During 2009, 4 180 fires were recorded, burning 860 ha of forest land, 283 ha of other wooded land and 394 ha of other land.

The largest recorded fire started on 25<sup>th</sup> of April and ended 4<sup>th</sup> of May 2009 in the Ale municipality. In this event about 550 ha of forest were burned. This fire occurred rather early in the season and a lot of old grass helped to spread the fire quickly. It was a period with dry weather and high temperature in the spring.

Figure 46 shows some images from the largest fire (550 ha) and a part of the burned area. The photos were taken during late autumn 2009, seven months after the fire. In the burned area were several electrical power lines. This type of ground, with open old grass areas under the power lines, allowed the fire to spread extremely quickly.



Figure 46. Images taken of the area affected by the largest fire of 2009



Figure 47 and Figure 48 show the pattern of fire occurrence and burnt area by month during the year. Figure 49 shows the dates and areas burned for the 16 largest fires of the season.

The burnt area, number of fires and average fire size for the years 1996 – 2009 are shown in Figure 50.

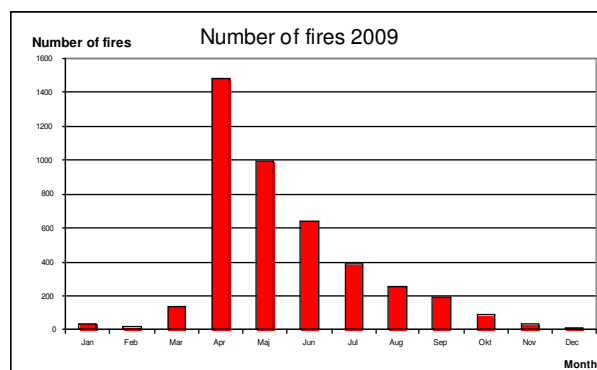


Figure 47. Fire frequency by month in 2009

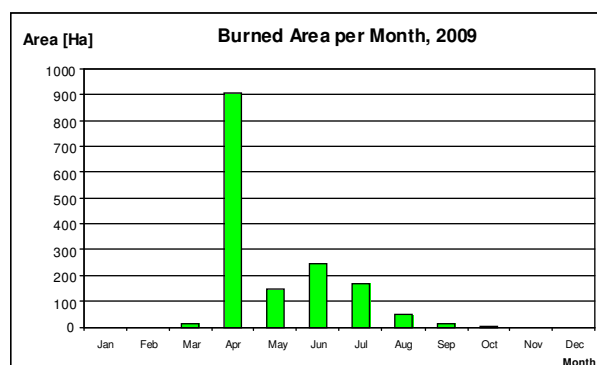


Figure 48. Burnt area by month in 2009

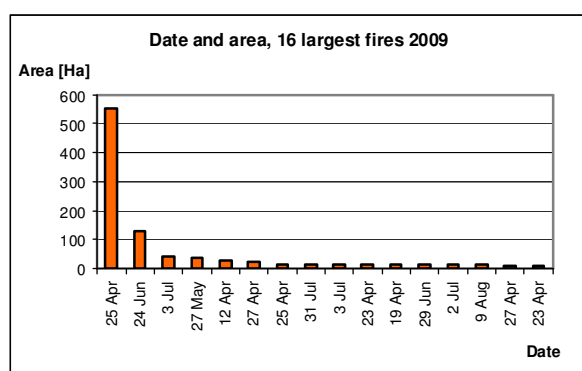
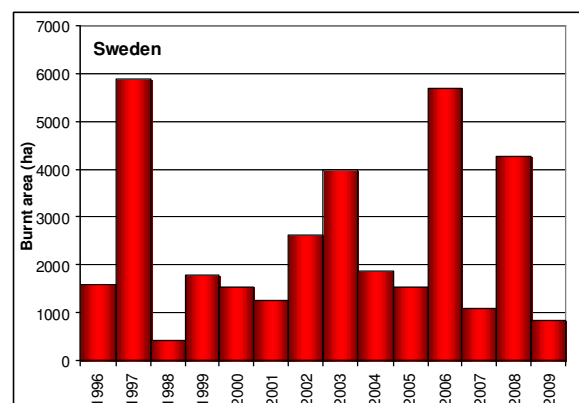
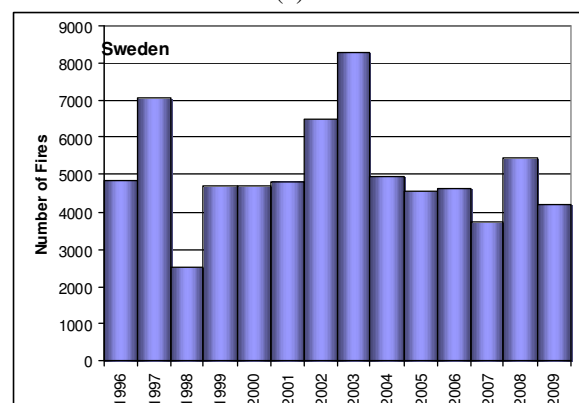


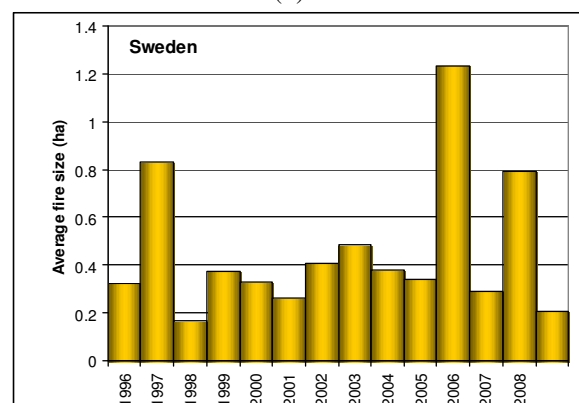
Figure 49. Date and area of the 16 largest fires in 2009



(a)



(b)



(c)

Figure 50. Burnt areas (a), number of fires (b) and average fire size (c) in Sweden from 1996 to 2009.

(Source: Swedish Civil Contingencies Agency (MSB), Risk & Vulnerability Department, Sweden).

## 1.2. EU CANDIDATE COUNTRIES

### 1.2.1. FYROM

The Republic of Macedonia covers a total area of 25 713 km<sup>2</sup>, with 997 000 ha of forest land and 1 244 000 ha of agricultural land.

As a result of very specific natural and geographical features there are two climatic types that collide in the Republic of Macedonia, *Mediterranean and Continental*, which results in cold and severe winters and hot and dry summers. The annual average air temperature is 11.3 degrees Celsius with average precipitation of 983.7 mm/m<sup>2</sup> and average sunshine period of 2 450 hours per year.

#### *Fire danger in the 2009 fire season*

The fire danger in 2009 season in Macedonia was at minimum level. The majority of fires occurred in late spring and during the summer months.

#### *Fire occurrence and affected surfaces*

During the year 2009 there were 869 fires of which 80 were forest fires, affecting in total an area of 503.25 ha. The forest land affected was 1 306.728 ha and 38.5% of the total number of fires were forest fires.

Comparing with the 2008 fire season there were 493 forest fires less in the 2009 fire season and the damage from the fires was significantly lower.

The comparative charts for burnt area, number of fires and average fire size for the years 2007-2009 are shown in Figure 51.

The number of fires and burnt area according to types of fires for the year 2009 are shown in Figure 52.

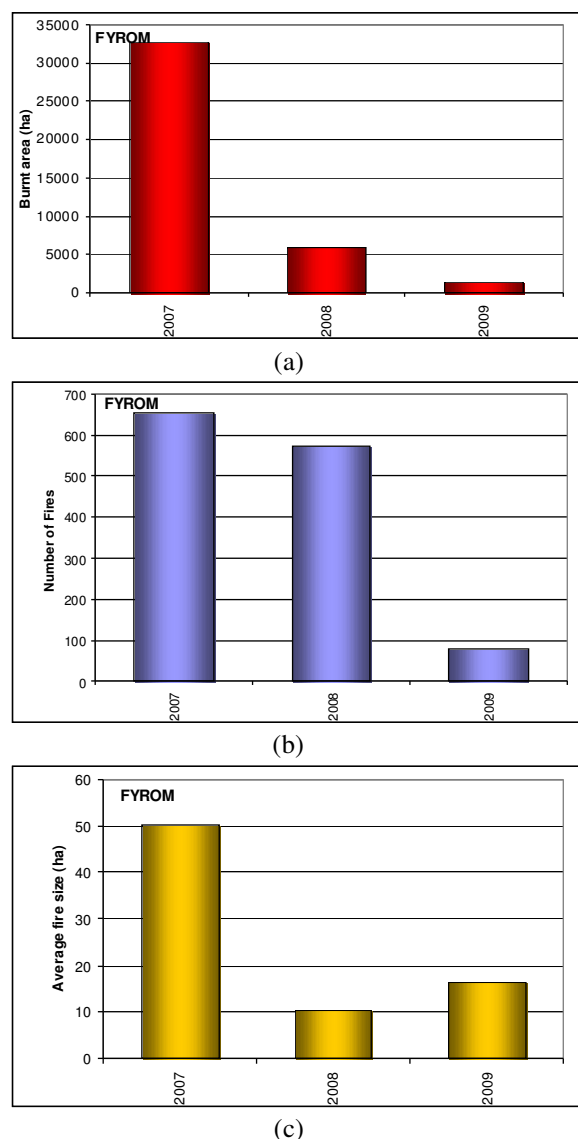


Figure 51. Burnt areas (a), number of fires (b) and average fire size (c) in FYROM from 2007 to 2009

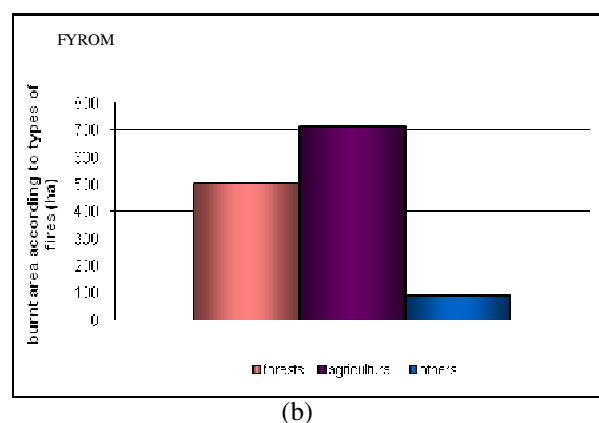
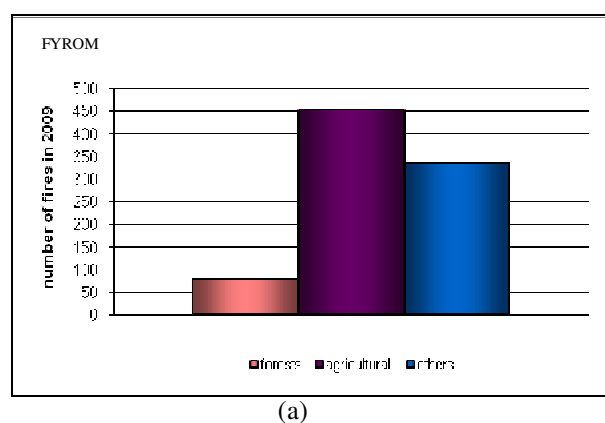


Figure 52. Number of fires (a) and burnt area (b) according to the type of fires in FYROM in 2009

### *Fire fighting means and information campaign*

Fire prevention and fire fighting activities were undertaken along with a public information campaign. For the purpose of awareness raising, media events such as press conferences, short reports and announcements on the TV and radio were organized.

Additionally, three Air Tractor airplanes have been procured and the training of the pilots is in the final stages. Also, 25 fire fighting vehicles are procured and 5 more will be procured during the year 2010.

### *Injuries and loss of human lives*

There were no lost lives or injured persons during the 2009 fire season.

(Source: Protection and rescue Directorate, Sector for analysis and research, FYROM)

## 1.2.2. Turkey

### *Fire danger in the 2009 fire season*

The fire season 2009 was a successful one in terms of number of fires and burned area compared with the last ten years. The number of fires, burned area and burned area per fire decreased compared with 2008.

### *Fire occurrence and affected surfaces*

In Turkey 1 793 forest fires occurred in 2009, burning 4 679 ha forest area. In terms of large fires, 1 event was larger than 500 ha (1 090 ha) and there were 4 events between 100 and 500 ha (199, 259, 237, and 335 ha). Approximately 82% of the ignitions were controlled before spreading (less than 1 ha) (Table 25).

Approximately 60% of Turkey's forest area is located in fire sensitive areas. Forest fire danger mostly occurs during the period of May-November, which is called the Fire Season, in particular during the months of June, July and August.

96% of the total number of forest fires occurred during the fire season in 2009.

When we look at the number of forest fires per month in 2009, we see that 25% occurred in July, 20% in August, and 13% in June. The distribution of burned area by months was 57% in August, 19% in July and 10% in June.

The burned area, number of fires and average fire size for the period of 1998-2009 are shown in Figure 53.

### *Fire causes*

The causes of forest fires in 2009: Negligence-Carelessness-Accident corresponded to 54%, Deliberate 8%, Lightning 19% and Unknown 19% (Figure 54).

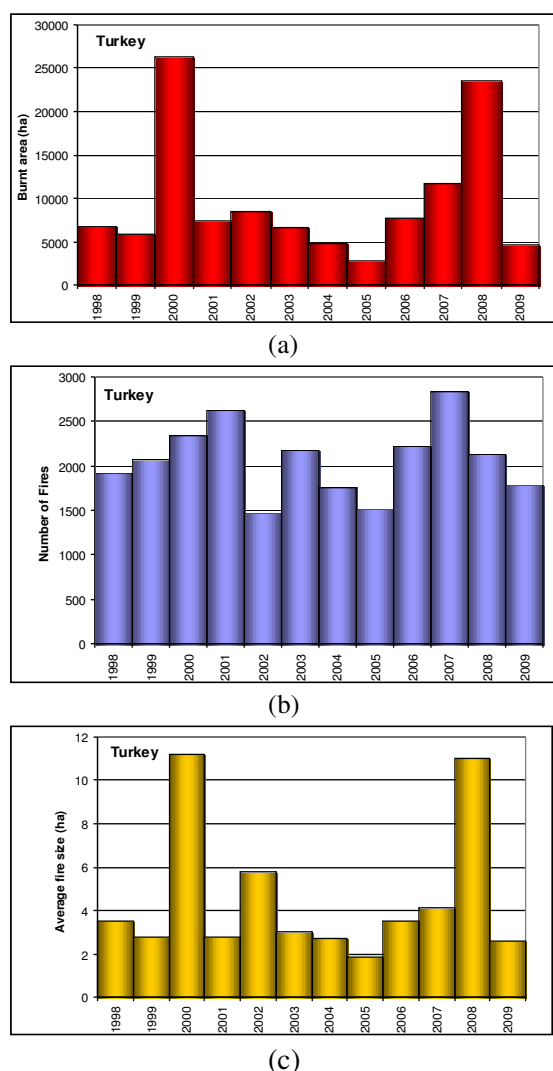


Figure 53. Burnt areas (a), number of fires (b) and average fire size (c) in Turkey from 1998 to 2009

Table 25. Number of fires and burned area by size in 2009

Fire size (ha)	<1.0	1.1-5.0	5.1-20.0	20.1-50.0	50.1-200.0	200.1-500.0	500.1-800	800.1-1500.0	TOTAL	Burnt area/Per fire (ha)
Number of fires	1470	235	56	25	4	2	-	1	1793	2.61
Burned area (ha)	440.9	619.2	621.9	806.7	528.0	572.0	-	1090.0	4678.7	

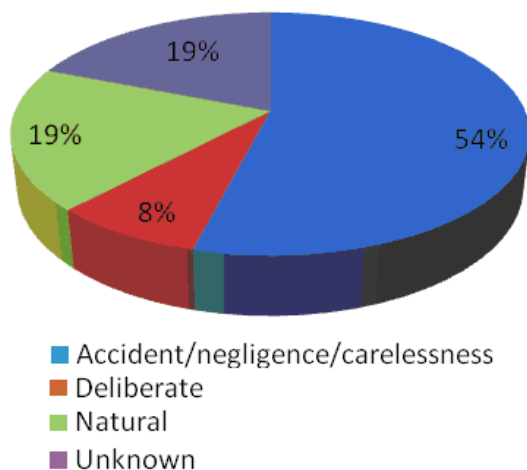


Figure 54. Causes of forest fires in 2009

#### *Fire fighting means and information campaigns*

Concerning the efforts to decrease the fire damages, 1 316 Km forest road, 365 Km fire safety road and 8 Km lookout tower roads were newly constructed.

The personnel involved in detection, communication, and suppression efforts comprised 1 524, 877, and 8 214 persons respectively.

The following ground and air equipment was used for fire fighting in the year of 2009:

1 117 fire trucks, 168 bulldozers, 497 water tanks, 132 graders, 110 trailers, 25 loaders, 230 caravans,

438 vehicles, 686 motorcycles, 6 administrative helicopters (owned by forestry organisation),

20 leased helicopters, 14 leased aircrafts (dromaders), 4 leased CL-215 Canadair.

Forest fire management strategies in Turkey are based on three basic principles:

- 1) Preventive Measures (Education and consciousness)
- 2) Early Warning, rapid and active intervention, Strong suppression
- 3) Reforestation of Burned Areas

So far, 776 fire towers have been built to detect fires and report to the suppression teams. Through these towers, forests are watched 24 hours a day.

All bulldozers, fire trucks and other service vehicles are being tracked by the system (Vehicle Tracking System) since 2007. This system improves efficiency in fire fighting.

Usage of automatic fire-detection system was extended in several regional forest directorates. The system provides rapid detection of forest fires through visible range optical cameras.

For the purpose of shortening the periods of forest fire attacks in forested areas where water sources are scarce, fire pools and ponds continued to be constructed. The aim is to construct fire pools & ponds five by five kilometres length in fire sensitive areas.

In relation to fire expenses, in 2009 295 million \$US were spent for all kinds of forest fire fighting related activities (prevention and suppression). The expenses for fire fighting related activities have been continuously increasing since 2001. This amount also includes the purchasing of different kinds of fire fighting means.

Education and awareness raising campaigns have been carried out to increase the consideration for forest fires and particularly with the aim of:

- Making people aware about the problem of forest fires;
- Training in primary schools, secondary schools and high schools;
- Training the forest fire fighting teams, technical personnel, forest villagers, shepherds, hunters and soldiers.

#### *Injuries and loss of human lives*

One pilot and one forest guard (in total 2 persons) lost their lives in a fire fighting helicopter accident while fighting against forest fires.

#### *Operations of mutual assistance*

One amphibious aircraft (CL-215 Canadair) was sent to Greece for the purpose of fighting forest fires which occurred around Athens in 2009.

(Source: General Directorate of Forestry, Forest Fires Department, Turkey)

### 1.3. OTHER EUROPEAN COUNTRIES

#### 1.3.1. Switzerland

Switzerland experienced a very dry summer in 2009. The lack of precipitation was similar to 2003, but without such high temperature. Despite these conditions, fire occurrence was very low. Many cantons issued warnings; the use of fire was restricted or banned during several weeks in some regions. The warnings were well followed, which may explain the low occurrence of fire events. No loss of life or major damage to buildings and infrastructure occurred in 2009. In the harsh mountainous landscapes of Switzerland with steep slopes, even small fires may jeopardise the protective function of the forests. Prevention is therefore the focus of the federal policy.

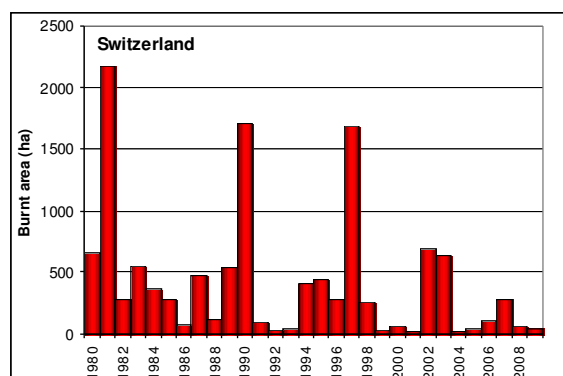
In Switzerland, it is the task of the cantons to issue warnings or fire bans. This system is efficient since only the regions actively get updated information about the real state of fuel in the forests. In 2009, several cantons issued fire bans over their entire territory or for some regions only. These are Valais, Ticino and Grisons. Other states actively informed people about the severe risk of forest fires and asked them to act with care. Communication of risk occurred mainly by means of radios, television and newspapers or in the Internet, but also using the federal platform for meteorological hazards. There was proactive information especially in the cantons of Vaud, Valais, Jura, Berne, in both Basels, Obwald, Glarus, Grisons, Sankt Gallen and Ticino. Particularly in the cantons of Ticino, Grisons and Valais, where most fires occur, there is an excellent collaboration between the forest services (forest authorities and rangers) and the civil protection services (fire brigades, police, ambulances).

With the implementation of the revised Federal Ordinance on Warning and Alarming on 1<sup>st</sup> January 2011, a harmonised system, including danger scale, will be introduced in Switzerland. The danger scale will be harmonised for all natural hazards, including forest fires, and effective in all cantons.

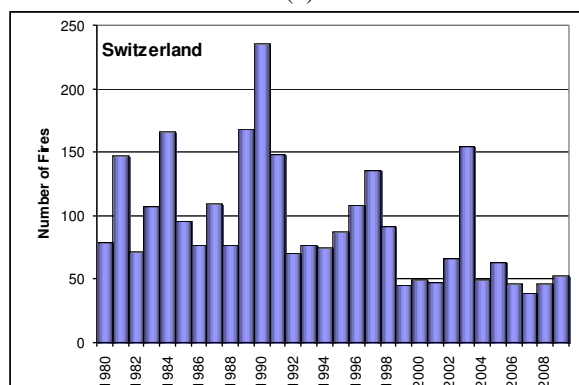
For 2009, fires from canton Ticino, Grisons, Aargau, Uri, Bern, Basel, Jura, Lucerne and St. Gallen were recorded in the database.

A total of 52 forest fires were registered in 2009, burning 42.55 hectares, which correspond to a fairly low occurrence since 1980. Average fire size was 0.8 ha and median fire size 0.04 ha.

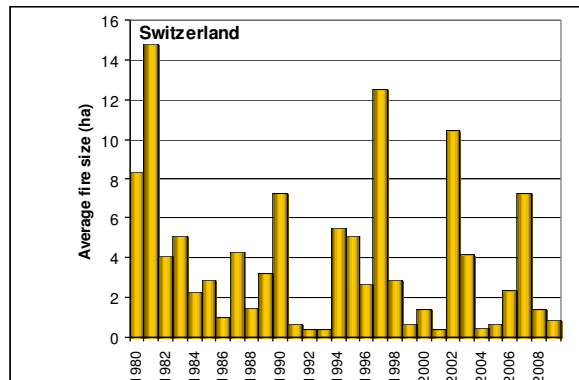
54% of the fires happened during the winter season (November to April), when also 87% of the burned surface occurred.



(a)



(b)



(c)

Figure 55. Burnt areas (a), number of fires (b) and average fire size (c) in Switzerland from 1980 to 2009.

(Source: Office fédéral de l'environnement (OFEV) and Swiss Federal Research Institute (WSL), Switzerland)

## 2. THE EUROPEAN FOREST FIRE INFORMATION SYSTEM (EFFIS)

In 1997 the European Commission set up a research group to work specifically on the development and implementation of advanced methods for the evaluation of forest fire risk and for the estimation of burnt areas in the European Union. This group is currently working as part of the Institute for Environment and Sustainability of the European Commission Joint Research Centre (JRC).

Since 1998, it has been collaborating with the relevant services in the Member States, under the coordination of DG Environment.

These activities led to the development of the European Forest Fire Information System (EFFIS) by the JRC, which started its operation in the year 2000. In 2003, EFFIS was officially established in the context of Regulation (EC) No 2152/2003 (Forest Focus) of the European Council and Parliament on monitoring of forests and environmental interactions.

The purpose of EFFIS is to provide information for the protection of forests against fire in Europe addressing both pre-fire and post-fire conditions. It also centralises the national fire data that the Member States collect through their national forest fire programmes. A web mapping interface has been set up on the EFFIS website (<http://effis.jrc.ec.europa.eu>) that allows users to access EU wide information about forest fires and other related environmental data.

The EFFIS module for the assessment of meteorological forest fire danger is the EFFIS Danger Forecast. This module forecasts forest fire danger in Europe on the basis of the Canadian Fire Weather Index (FWI), allowing a harmonized evaluation of the forest fire danger situation during the year. Until 2005 the danger assessment was performed for a period of six months and since 2006 for a period of 9 months. Therefore, also in 2009, EFFIS Danger Forecast started to evaluate forest fire danger on 1 February 2009, and ended on 31 October 2009. Forest fire danger maps were computed and broadcasted to the relevant services in the Member States and the European Commission.

The JRC evaluates the annual damage caused by forest fires in Europe using the EFFIS Rapid Damage Assessment module. The evaluation focuses mainly on Southern Europe, where most of the fire damages are concentrated. Since 2000, cartography of all the burned areas is produced

every year through the processing of satellite imagery. In the year 2003, due to the availability of daily satellite imagery from the MODIS sensor on board of the TERRA and AQUA satellites, the RDA provided frequent updates of the total burnt area in Europe. Currently, the RDA is updated up to two times every day. The areas affected by fires of at least 40 ha correspond, on average, to 75% to 80% of the total area burnt in Europe each year. Further to the mapping of burnt areas, the analysis of which types of land cover classes are affected by fires is performed. This module uses MODIS satellite imagery with a ground spatial resolution of about 250 metres, which permits the mapping of fires of 40 ha or larger. With this system the evaluation of damages is performed daily, providing weekly statistics at country level, and contributing to newsletters that are published during the fire campaign. The final results are included in the yearly "Forest Fires in Europe" report.

Other modules, under development within EFFIS, are looking into other aspects of forest fires such as vegetation regeneration after the fires, estimation of forest fire emissions, and the identification of post-fire risk areas that may be subject to further damages such as soil loss and/or landslides. The estimations of atmospheric emissions are already available in the EFFIS web mapping interface (<http://effis.jrc.ec.europa.eu>).

### 2.1. EFFIS DANGER FORECAST: 2009 RESULTS

The EFFIS Danger Forecast was developed to support the Commission's Directorate-General for the Environment and the forest fire-fighting services in the EU Member States. Since 2002, at the request of the Member States, operation of the EFFIS Danger Forecast has been extended to six months starting on 1 May and ending on 31 October and in 2006 to nine months, from 1 February to 31 October.

In this chapter the fire danger trends assessed by EFFIS in the different countries during the fire season 2009 are presented, comparing them with previous years.

**In the Mediterranean region** of Europe fire weather conditions were fairly mild until July, after relatively intense fire activity in Northern Portugal and North western Spain in the second half of March, which was driven by dry weather and strong winds. In the second half of July severe conditions affected South western



countries in particular (Spain and Italy above all, but also France, though to a lesser extent), causing significant damage. At this time, the country averages of the Fire Weather Index (FWI, the index used to rate the danger level due to meteorological conditions), exhibited maximum values for 2009 for these three Member States. In the last ten days of August, extreme weather led to extreme fire activities in Greece with major fire events reported, especially around the area of Attica. At the end of August / beginning of September, Portugal experienced the more severe conditions of the current fire season for the country, causing significant amounts of damage.

**In Central and Northern EU regions** the maximum fire danger level of the 2009 season was reached at the end of June in Scandinavian countries, when significant fire activity was observed especially in Sweden. Some activity had already started in the second half of April when a large fire was recorded in the area of Vastra Gotlands lan. A similar trend was observed in central Europe, though with less important fire activities. Fire danger remained above the average during the month of August in Germany and Poland, with large oscillations in Bulgaria, Hungary and Romania.

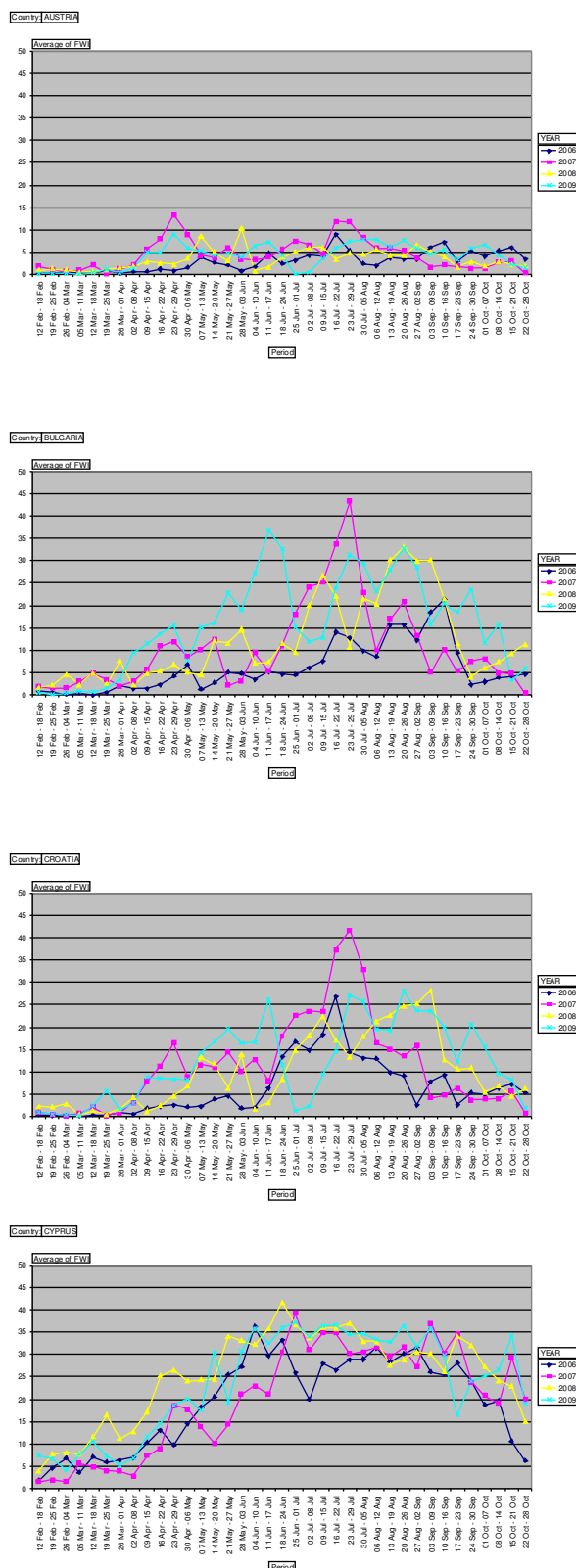
Through the Danger Forecast module of EFFIS the situation has been continuously monitored and the risk level analyzed and mapped.

The following figures show fire danger through 2009 as determined by the average FWI values assessed during the fire season in the individual countries.

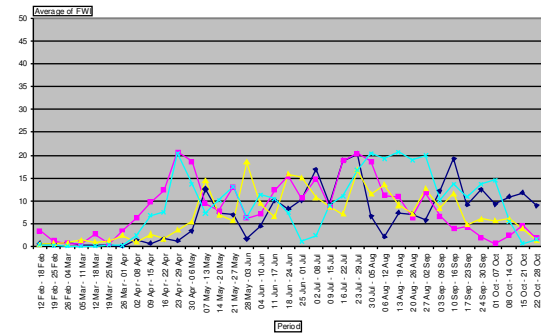
The graphs show the weekly averages of FWI over entire countries; therefore local peaks might have been flattened, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes; nevertheless the general trend is depicted providing relevant information about the fire danger level and trends of the year.

To allow a better comparison with past seasons, the curves of 2006, 2007 and 2008 are presented in conjunction with 2009 for all countries.

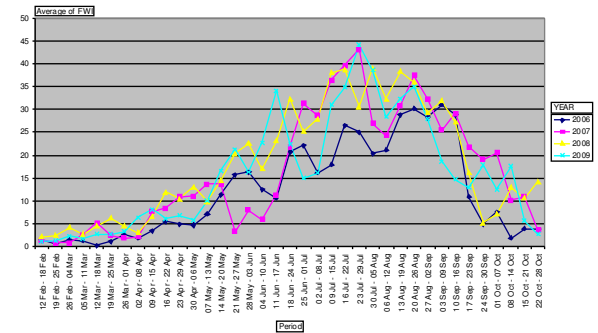
The countries analyzed are those participating in the EFFIS network and are shown in alphabetic order in the graphs that follow.



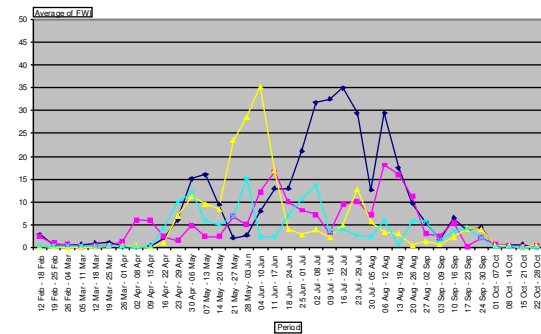
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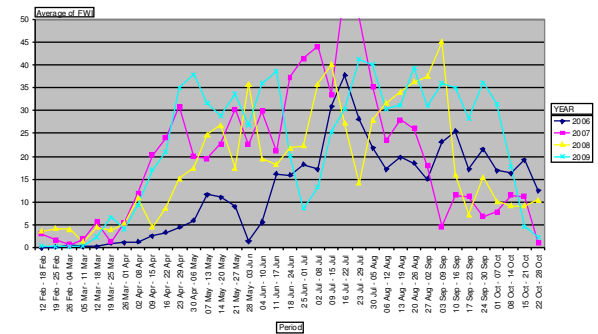
Country: GREECE



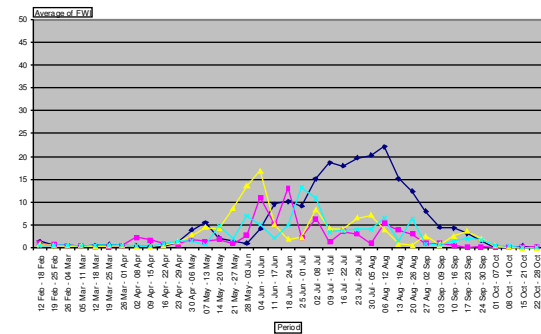
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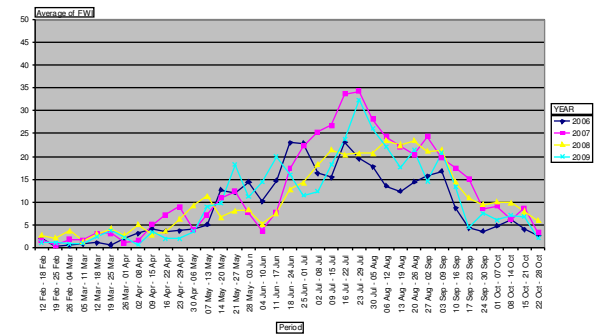
Country: HUNGARY



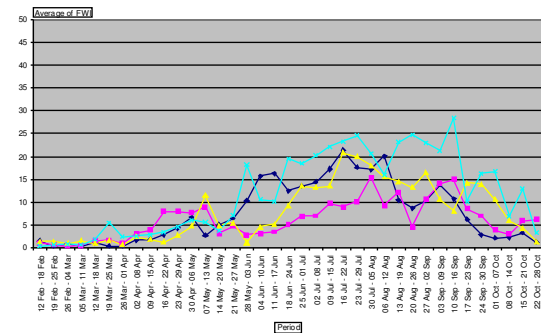
Country: FINLAND



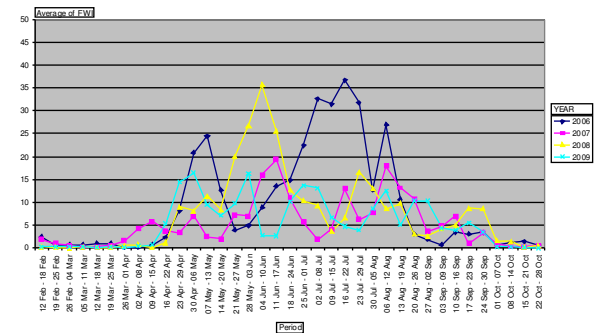
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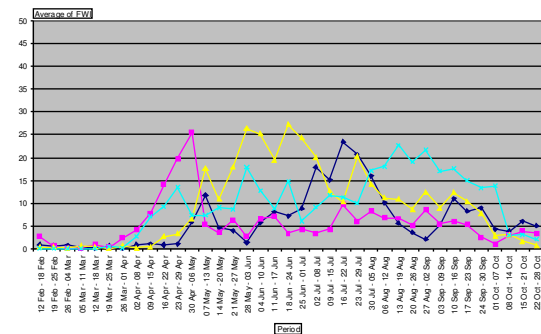
Country: FRANCE



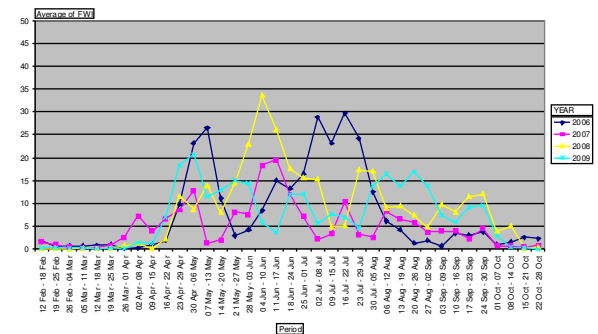
Country: LATVIA



Country: GERMANY

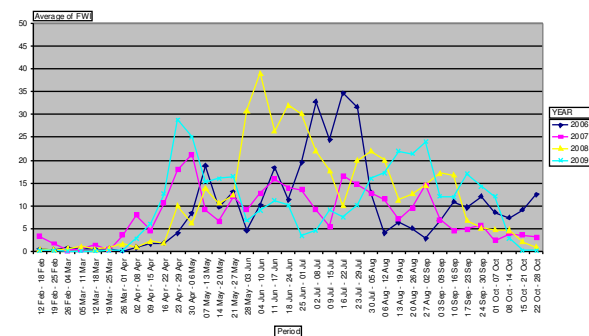


Country: LITHUANIA

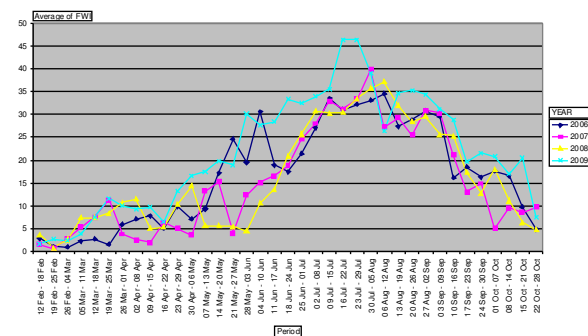




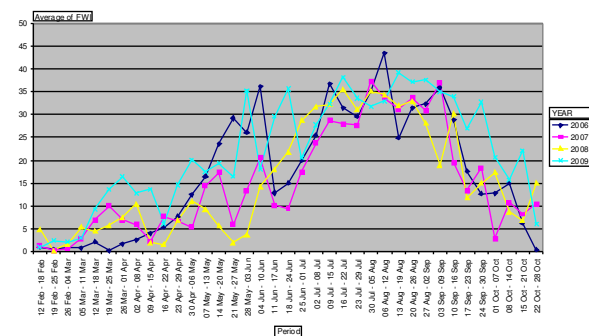
County POLAND



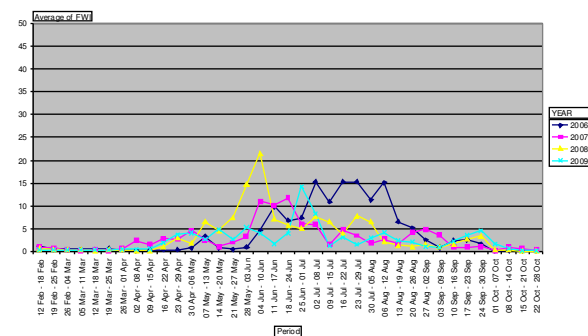
County SPAIN



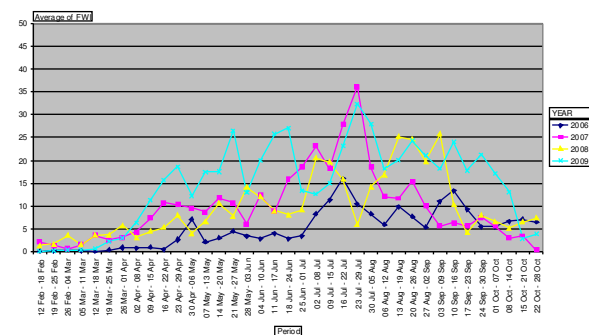
County PORTUGAL



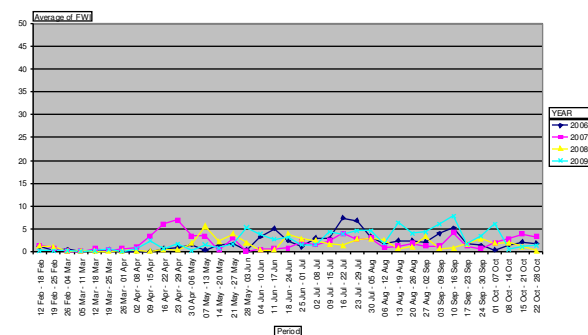
County SWEDEN



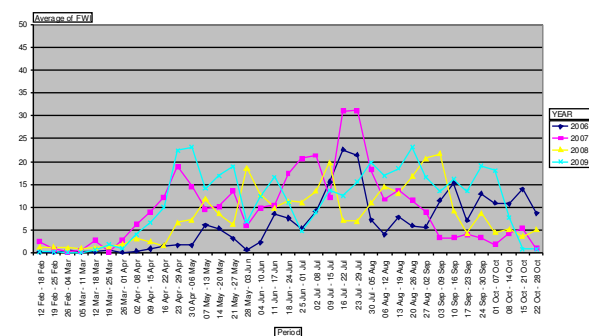
County ROMANIA



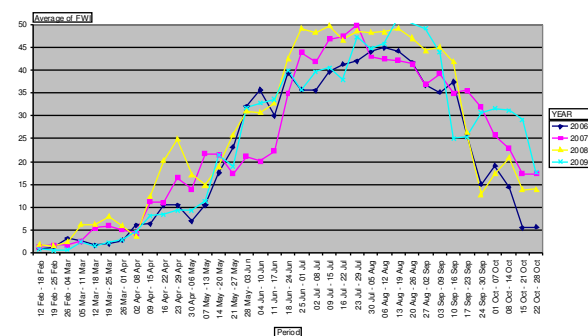
County SWITZERLAND



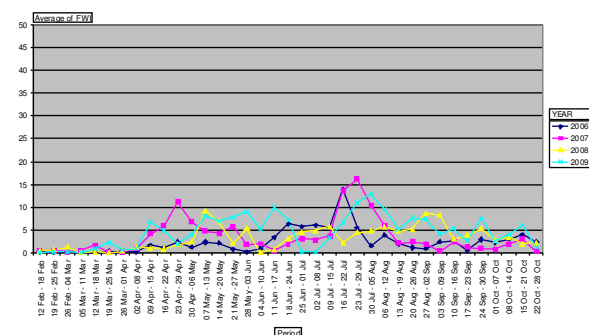
County SLOVAKIA



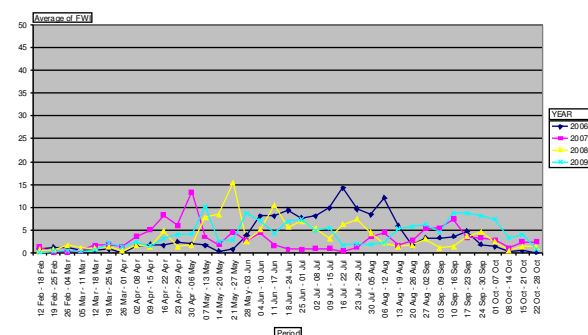
County TURKEY



County SLOVENIA



County UNITED KINGDOM



As mentioned previously, weekly country averages tend to flatten local fire danger peaks, which as a consequence become less evident, especially in those countries such as France or Italy, where there are strong differences in fire danger level with changing latitudes.

Therefore, to show more clearly the seasonal changes in FWI in the larger EU Mediterranean countries, i.e. Portugal, Spain, France, Italy and Greece, their territory has been further divided for fire danger reporting, according to the map shown in Figure 56. The division criteria are mainly administrative and should be taken as provisional, since other fire risk reporting sub-regions, with a specific focus on environmental criteria, might be proposed in the future.



Figure 56. Sub-country regions identified for fire danger trend reporting in the five Mediterranean most affected Member States.

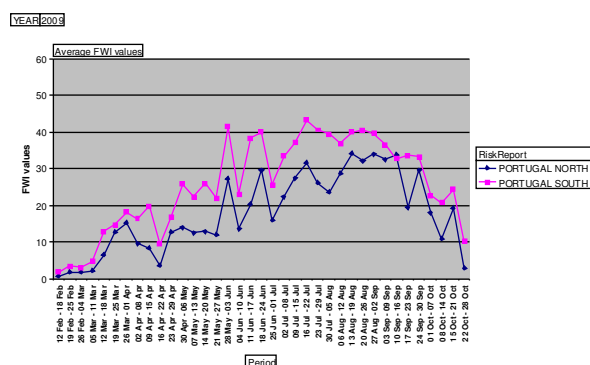


Figure 57. Fire danger trends in 2009 as determined by the Fire Weather Index (FWI) in the regions identified for Portugal

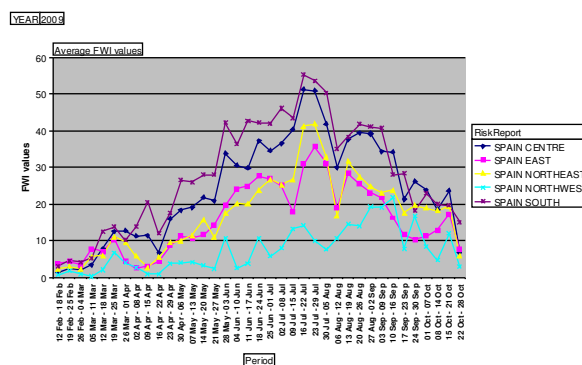


Figure 58. Fire danger trends in 2009 as determined by the Fire Weather Index (FWI) in the regions identified for Spain

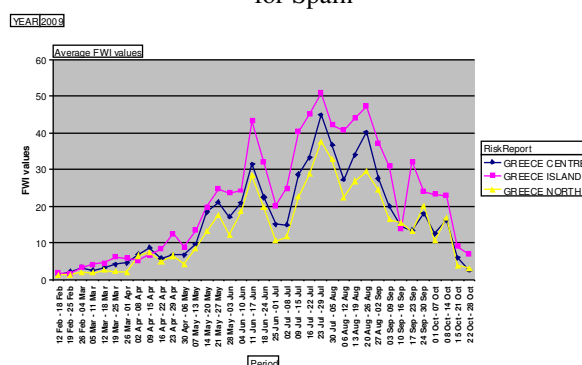


Figure 59. Fire danger trends in 2009 as determined by the Fire Weather Index (FWI) in the regions identified for Greece

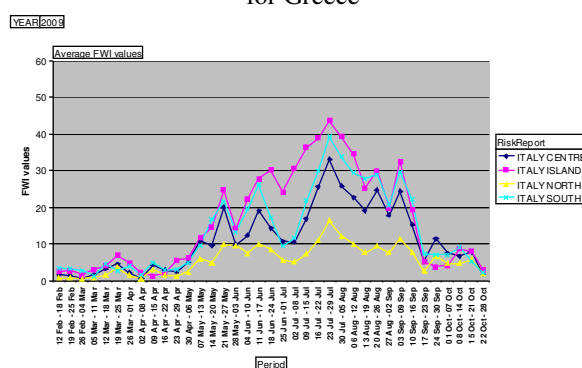


Figure 60. Fire danger trends in 2009 as determined by the Fire Weather Index (FWI) in the regions identified for Italy

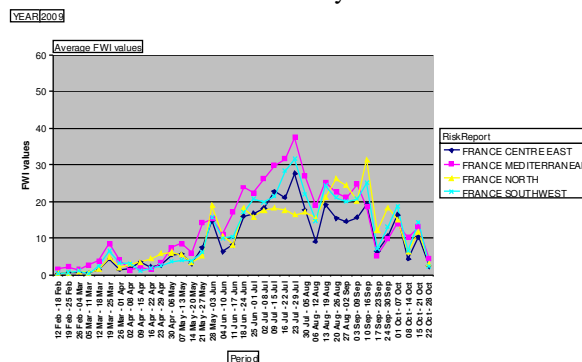


Figure 61. Fire danger trends in 2009 as determined by the Fire Weather Index (FWI) in the regions identified for France.

To facilitate the comparison among the different countries in EU, in the next graphs (Figure 62 to Figure 67), the fire danger trends as determined by FWI are shown for Member States grouped by main bioclimatic type (e.g. Mediterranean, temperate or boreal) and for Candidate countries. Data are given for 2007 to 2009.

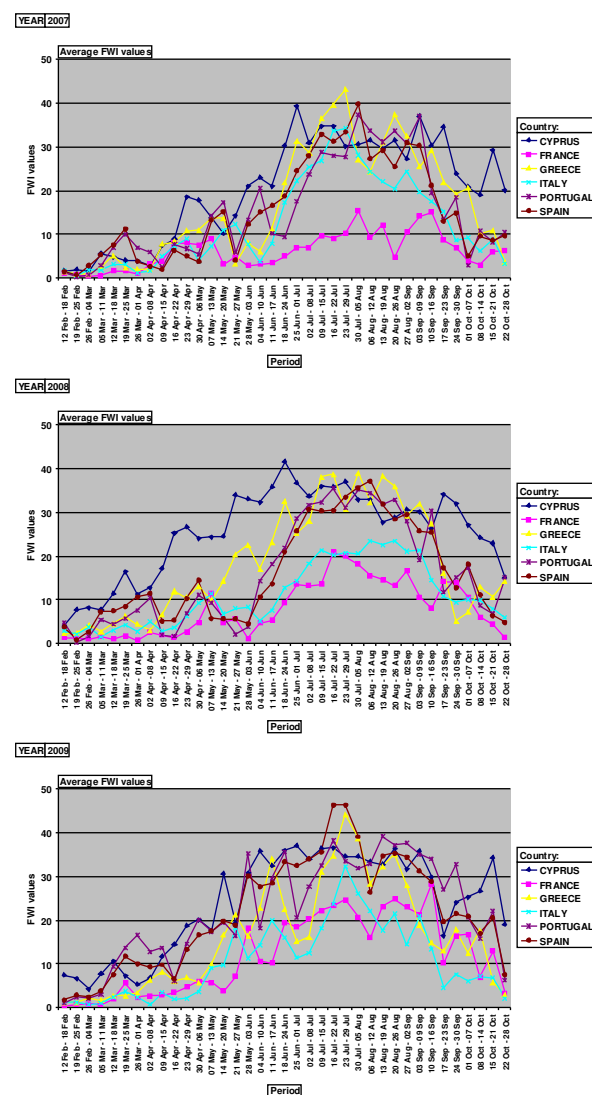


Figure 62. Fire danger trends 2007-2009 in EU Mediterranean countries (CY, FR, GR, IT, PT, ES).

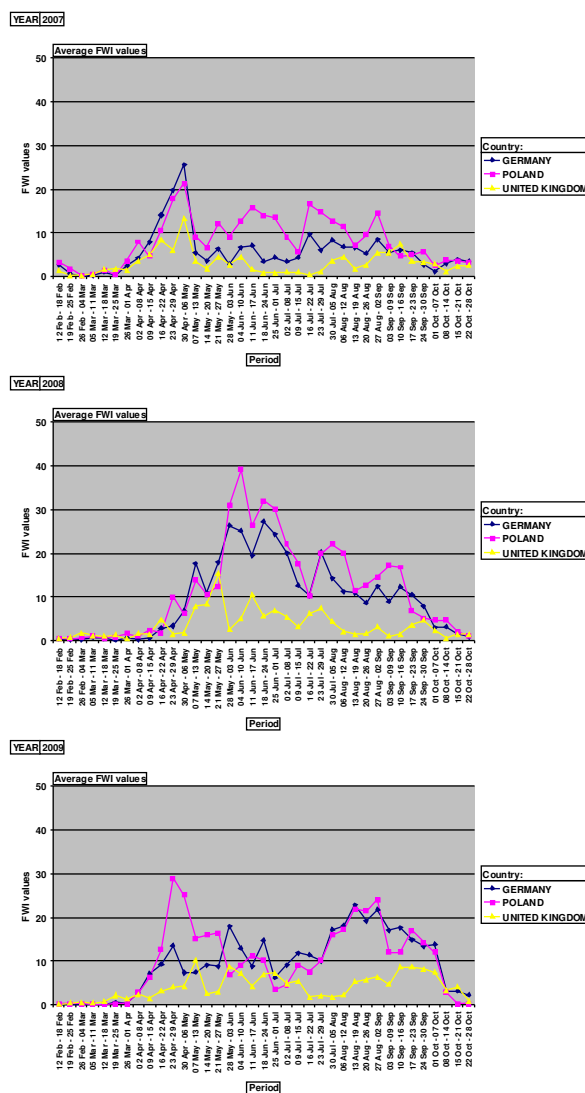


Figure 63. Fire danger trends 2007-2009 in some EU temperate countries (DE, PL, UK).

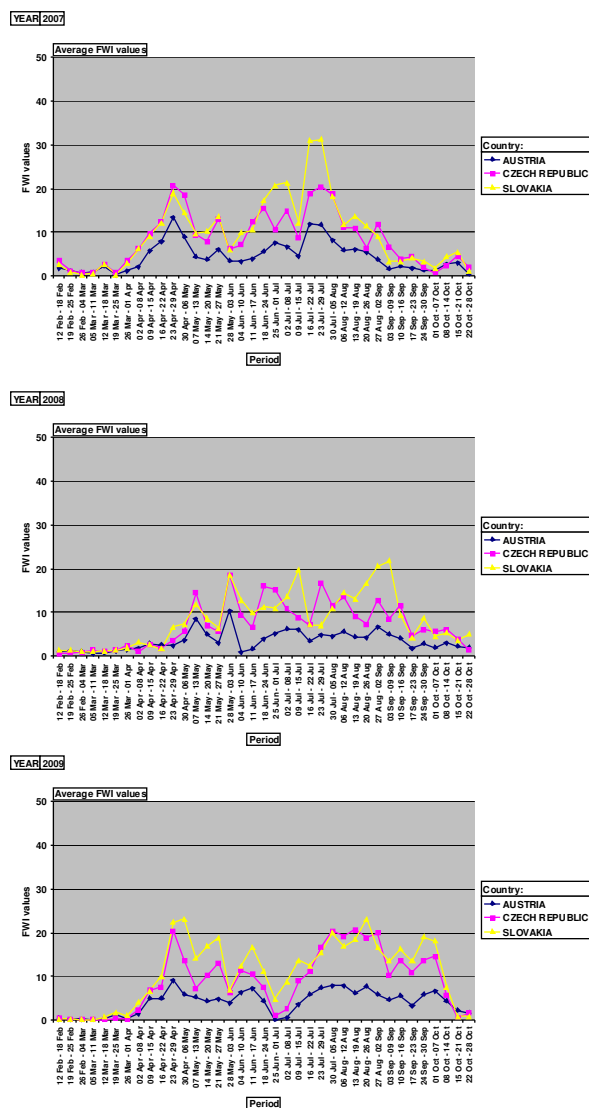


Figure 64. Fire danger trends 2007-2009 in some EU temperate countries (AT, CZ, SK).

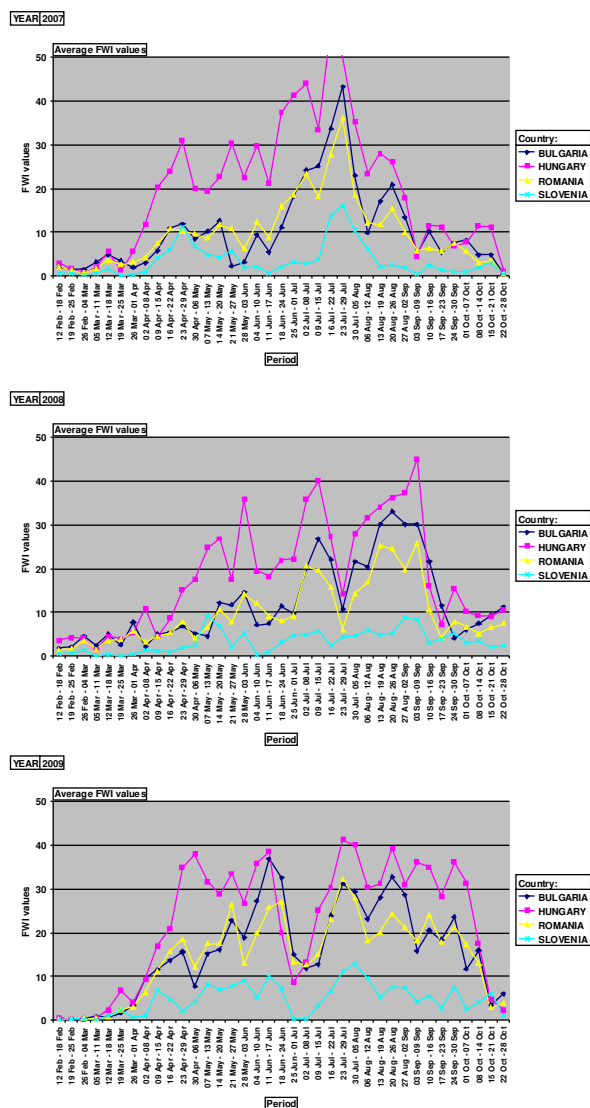


Figure 65. Fire danger trends 2007-2009 in some EU temperate countries (BG, HU, RO, SI).

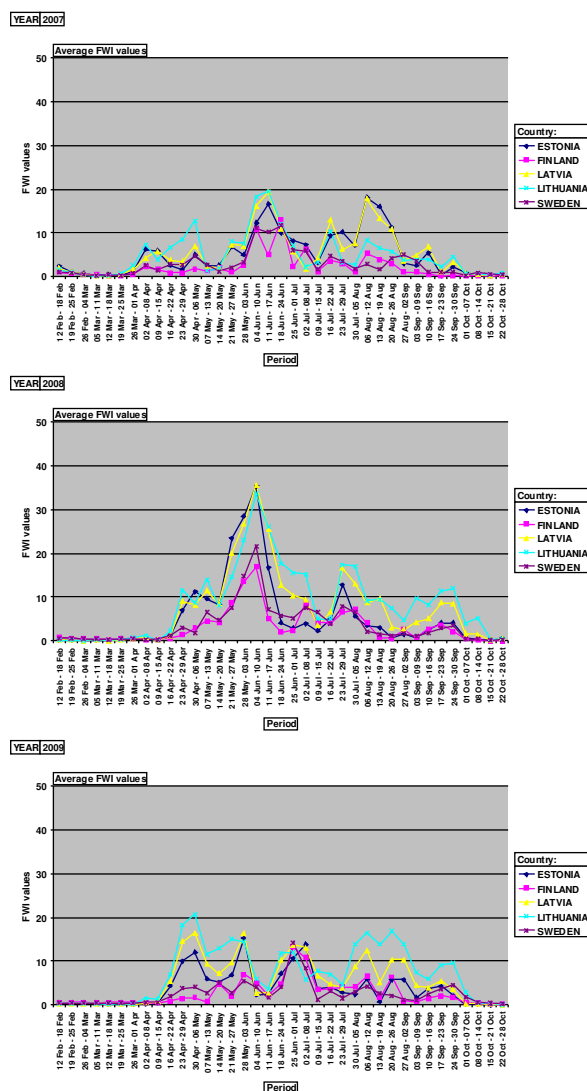


Figure 66. Fire danger trends in the last 3 years (2007-2009) in some EU boreal countries (EE, FI, LV, LT, SE).

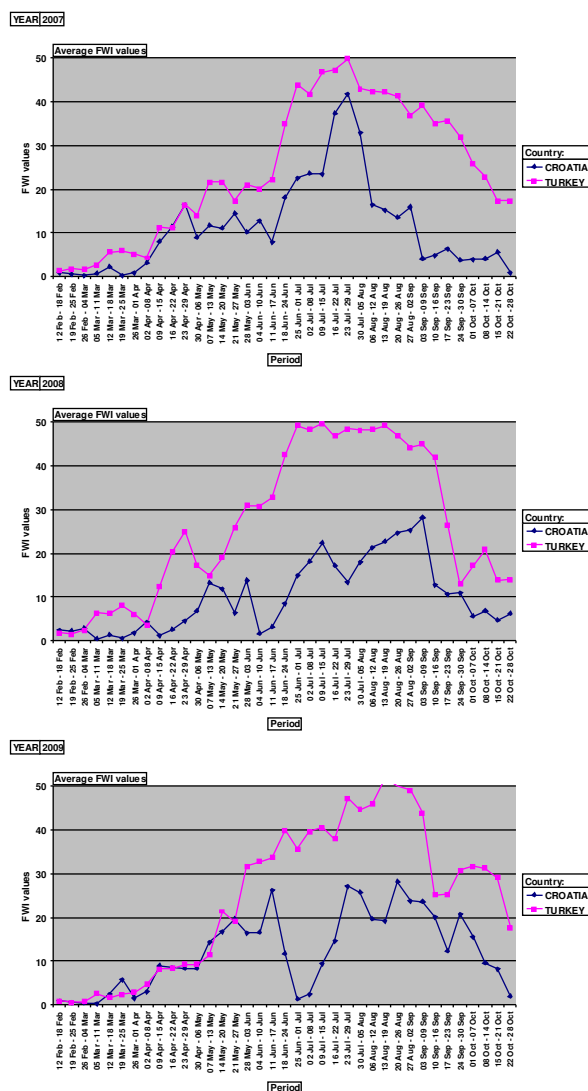


Figure 67. Fire danger trends in the last 3 years (2007-2009) in EU candidate countries (HR, TR).

As in previous years, the Member States gave very positive feedback on the danger assessment activity, urging that the EFFIS Danger Forecast should be continued and improved as part of the European Forest Fire Information System. This dialogue with users and other stakeholders is bound to result in an improved civil protection and forest fire service across Europe, and helps meet the EU's aim of providing environmental information and services that can be combined with other global environmental information products, in support of the Global Monitoring for Environment and Security (GMES) initiative.

## 2.2. EFFIS RAPID DAMAGE ASSESSMENT: 2009 RESULTS

The Rapid Damage Assessment module of EFFIS was set up to provide reliable and harmonized estimates of the areas affected by forest fires during the fire season. The methodology and the spatial resolution of the satellite sensor data used for this purpose allows the mapping of all fires of about 40 ha or larger. In order to obtain the statistics of the burnt area by land cover type the data from the European CORINE Land Cover 2000 (CLC) database are used. Therefore the mapped burned areas are overlaid to the CLC data, allowing the derivation of damage assessment results comparable for all the EU Countries.

EFFIS Rapid Damage Assessment is based on the analysis of MODIS satellite imagery. The MODIS instrument is on board both the TERRA (morning pass) and AQUA (afternoon pass) satellites. MODIS data has 2 bands with spatial resolution of 250 meters (red and near-infrared bands) and 5 bands with spatial resolution of 500 meters (blue, green, and three short-wave infrared bands). Mapping of burnt areas is based mainly on the 250 meters bands, although the MODIS bands at 500 meters resolution are also used, as they provide complementary information that is used for improved burnt area discrimination. This type of satellite imagery allows detailed mapping of fires of about 40 ha or larger. Although only a fraction of the total number of fires is mapped (fires smaller than 40 ha are not mapped), the analysis of historical fire data has determined that the area burned by wildfires of this size represents in most cases the large majority of the total area burned. On average, the area burned by fires of at least 40 ha accounts for about 75% to 80% of the total area burnt every year in the Southern EU.

Since 2008, EFFIS includes Northern African countries in the mapping of burned area, following the agreement with FAO *Silva Mediterranea*, the FAO statutory body that covers the Mediterranean region. This is intended to be a first step towards the enlargement of EFFIS to the non-European countries of the Mediterranean basin.

The results for each of the EU southern European countries mostly affected by forest fires (Portugal, Spain, France, Italy, Greece, and Cyprus) are given in the following paragraphs. In addition, an analysis for other

countries in the regions that had large forest fires is also presented. Large fires occurred across the whole Mediterranean region, as critical weather conditions in this region alternated from west to east along the fire season. Large burnt areas can thus be found both in the west (Portugal and Spain) and in the east (Italy and Greece) of the Mediterranean region. However, it is also notable that nearly one third of the total monitored burned areas were located in North Africa (in particular Algeria with 141 925 ha burnt). Overall, 2009 was a fairly average year in terms of the damages caused by forest fires in Europe. Among European countries the greatest damage occurred in Spain and Portugal, followed by Italy, and then Greece. Detailed analysis of the fire campaign in those countries has already been presented in previous chapters of this report. The total area burned in 2009 by fires larger than 40 ha, as shown by the analysis of satellite imagery, was 438 417 ha (Table 26). These figures may include agricultural and urban areas that were also burned during the forest fires.

Table 26. Areas burned by fires of at least 40 ha in 2009 estimated from satellite imagery.

<i>Country</i>	<i>Area (Ha)</i>
Albania	7606.86
Algeria	141925.13
Bosnia	181.47
Bulgaria	1563.69
Croatia	2208.32
France	7972.32
FYROM	901.20
Greece	42759.93
Israel	45.92
Italy	54942.55
Montenegro	103.25
Morocco	2111.86
Portugal	75264.52
Spain	88886.43
Sweden	741.98
Syria	5276.05
Tunisia	128.96
Turkey	5796.93
<b>TOTAL</b>	<b>438417.35</b>

Of particular interest is the analysis of the damages caused by fires to the areas protected within the Natura2000 network, as they include habitats of especial interest which are home for endangered plant and animal species. However, the category of Natura2000 areas only exists in

the countries of the European Union. Information on other protected areas outside the EU is not available and is thus not presented in this report. The area burnt within the Natura2000 sites is presented in Table 27.

Table 27. Area burnt in 2009 within Natura 2000 sites.

<i>Country</i>	<i>Area (Ha)</i>
Bulgaria	1371.07
France	1111.01
Greece	2752.88
Italy	13864.86
Portugal	18883.81
Spain	48961.13
Sweden	52.15
<b><i>TOTAL</i></b>	<b><i>87000.55</i></b>

Figure 68 shows the scars caused by forest fires during the 2009 season. The accumulation of burnt scars on the north of Portugal and Spain is noticeable on this picture. This year the mapped area also includes North African countries, and the significant burnt areas in Algeria are clearly visible.

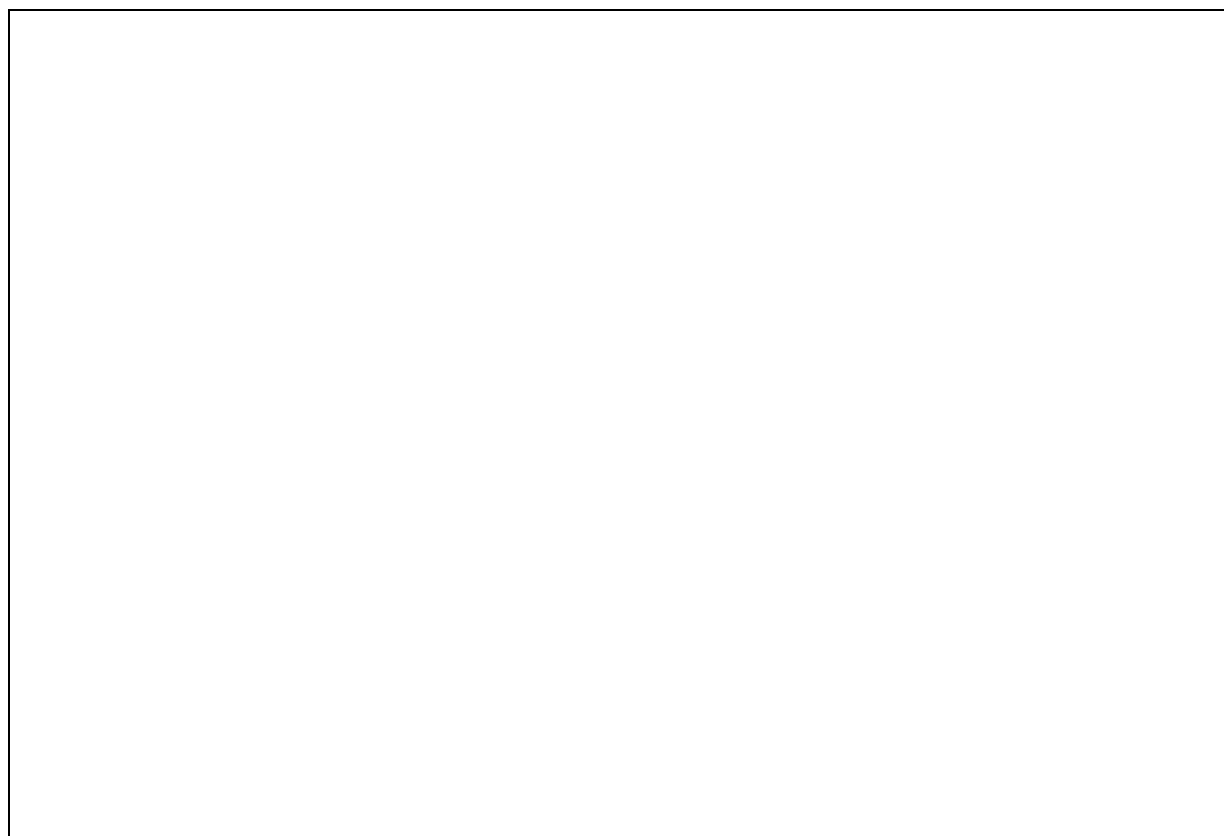


Figure 68. Burnt scars produced by forest fires during the fire season 2009.



### 2.2.1. Portugal

Portugal was the second European country most severely affected by fires in 2009, in terms of burned area. However, although the total burnt area mapped was significantly higher than it has been for the last 3 years, it was still below the average of the last decade. The total burned area mapped in Portugal was 75 264.52 ha. This area includes 18 883.81 ha on Natura2000 sites, corresponding to 25.1 % of the total area burned, and 0.98 % of the total Natura2000 areas in Portugal. Table 28 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 75 264.52 ha of burnt area mapped, 28 517.53 ha of land burnt were forest and Other Wooded Lands, 93 83.36 ha were on agricultural land and 37 269.16 ha in other natural lands. Some of the forest fires that affected Portugal are presented in Figure 69, showing the heavy concentration of fires in central and northern regions.

Table 28. Distribution of burnt areas (fires of at least 40 ha) by land cover class in Portugal.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total burned</i>
Artificial Surfaces	50.36	0.07%
Agricultural Areas	9383.36	12.47%
Forest/Other Wooded	28517.53	37.89%
Other Natural L ands	37269.16	49.52%
Other Land Cover	44.11	0.06%
<b>Total:</b>	<b>75264.52</b>	<b>100.00%</b>

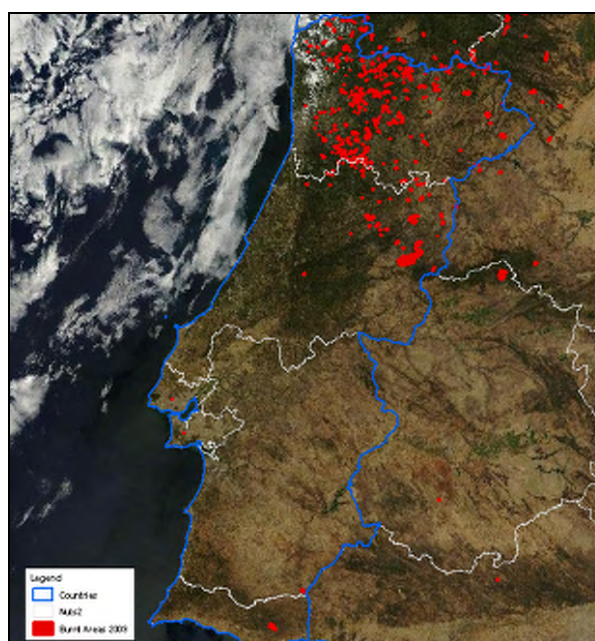


Figure 69. Impact of forest fires in Portugal.

### 2.2.2. Spain

Spain was the European country most severely affected by fire in 2009, and recorded the third highest burned area since 2001 (only 2005 and 2006 were higher). The most critical periods occurred in July and August with more than 75% of the total damage occurring during these two months. The total mapped burned area was 88 886.43 ha. Of this area 48 961.13 ha were on Natura2000 sites, corresponding to 55% of the total area burned, and 0.34 % of the Natura2000 areas in Spain. Table 29 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. In terms of land cover, from a total of 88 886.43 ha of burnt area mapped, 50 931.75 ha of land were burnt in forests and other wooded lands, 20 070.07 ha were other natural lands, and 17 526.07 ha were agricultural land. Additionally, 66.27 ha burned other land cover types.

The most noticeable fires in Spain during 2009 are presented in Figure 70.



Figure 70. Impact of forest fires in Spain.

Table 29. Distribution of burned area (ha) in Spain by land cover type

<i>Land cover</i>	<i>Area burned</i>	<i>% of total burned</i>
Artificial Surfaces	292.28	0.33%
Agricultural Areas	17526.07	19.72%
Forest/Other Wooded	50931.75	57.30%
Other Natural Lands	20070.07	22.58%
Other Land Cover	66.27	0.07%
<b>Total:</b>	<b>88886.43</b>	<b>100.00%</b>



### 2.2.3. France

The mapped burnt areas in France were somewhat higher than the last 3 years, although remaining slightly lower than the average for the decade. Maximum damage occurred in the last 10 days of July, when several large fires occurred in Corsica (the main ones in Aullene and Sartene provinces) and one near Marseille. The total burned area mapped in France was 7 972.32 ha. From this area 1 111.01 ha were on Natura2000 sites, corresponding to 13.9 % of the total area burned, and 0.02 of the total Natura2000 areas in the country. Table 30 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. In terms of land cover, from a total of 7 972.32 ha of burnt area mapped, 4 222.75 ha of land were burnt in forest and other wood lands, 1 161.87 ha were agricultural land, and 2 537.66 ha were other natural lands. Additionally, 50.04 ha of artificial surfaces, including urban, industrial and social areas, were affected by forest fires. The largest fires, which occurred in the southern part of France and in Corsica, are shown in Figure 71.

Table 30. Distribution of burnt areas (fires of at least 40 ha) by land cover type in France.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Artificial Surfaces	50.04	0.63%
Agricultural Areas	1161.87	14.57%
Forest/Other Wooded	4222.75	52.97%
Other Natural Lands	2537.66	31.83%
<b>Total:</b>	<b>7972.32</b>	<b>100.00%</b>

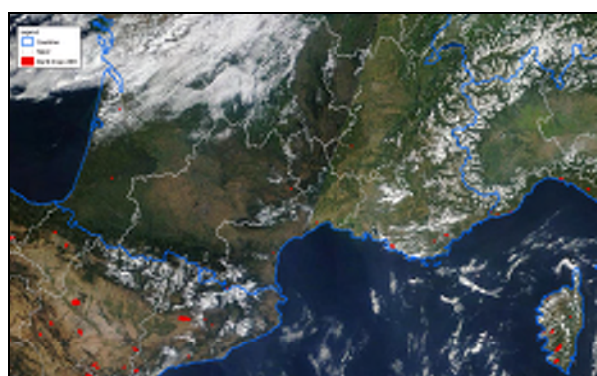


Figure 71. Burnt areas in southern France.

### 2.2.4. Italy

The 2009 fire campaign in Italy was intense, with the second largest burned area mapped (after 2007) since 2003 and the third worst affected European country in 2009. The total burned area was 54 942.55 ha. From this area 13 864.86 ha were on Natura2000 sites, corresponding to 25.2 % of the total area burned, and 0.24 % of the total Natura2000 area in the country. Table 31 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. In terms of land cover, from a total of 54 942.55 ha of burnt area mapped, 12 184.99 ha of land were burnt in forests and semi-other wooded lands, 28 760.99 ha were agricultural land, and 13 741.77 ha were other natural lands. A total of 254.80 ha of artificial areas (urban, industrial and social areas) were also affected by fires. Figure 72 shows the distribution of major forest fires in central and southern Italy and the results of the large fires in Sardinia.



Figure 72. impact of forest fires in Italy.

Table 31. Distribution of burnt areas (fires of at least 40 ha) by land cover type in Italy.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total burned</i>
Artificial Surfaces	254.80	0.46%
Agricultural Area	28760.99	52.35%
Forest/Other Wooded	12184.99	22.18%
Other Natural Lands	13741.77	25.01%
<b>Total:</b>	<b>54942.55</b>	<b>100.00%</b>

### 2.2.5. Greece

The 2009 fire campaign in Greece showed an increase from 2008, and the burned area mapped was the second highest since the early part of the decade, although still far below the peak of over 271516.38 ha mapped in 2007. The total burned area mapped in Greece in 2009 was 42 759.40 ha making it the fourth worst affected European country in 2009. Of this area, 2 752.88 ha were on Natura2000 sites, corresponding to 6.4 % of the total area burned and to 0.10 % of the Natura2000 areas in the country. Table 32 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 42 759.40 ha of burnt area mapped, 27 886.66 ha were forests and other wooded land, 9 562.27 ha were agricultural areas, and 3 501.37 ha were other natural lands. 1 639.81 ha artificial areas (urban, industrial and social areas) were also burnt by forest fires. Figure 73 shows the damages caused by forest fires in Greece.

Table 32. Distribution of burnt areas (fires of at least 40 ha) by land cover class in Greece.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Artificial Surfaces	1639.81	3.83%
Agricultural Areas	9562.27	22.36%
Forest/Other Wooded	27886.66	65.22%
Other Natural Lands	3501.37	8.19%
Other Land Cover	169.29	0.40%
<b>Total:</b>	<b>42759.40</b>	<b>100.00%</b>



Figure 73. Satellite image showing the impact of forest fires in Greece.

### 2.2.6. Bulgaria

The fire season in Bulgaria was mild. Large fires mapped from satellite imagery (i.e. those affecting more than 50 ha), burnt 1 563.69 ha, mostly during 2 fires around August 27 in the provinces of Haskovo and Yambol which burnt around 1 000 ha. Of the total burnt area, 1 371.07 ha were on Natura2000 sites. This constitutes 87.7 % of the total area burned, although only 0.04 % of the total Natura2000 area in the country. Table 33 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. A total of 594.92 ha were burnt in forests and other wooded lands and 519.40 ha were burnt in other natural lands. Fires also affected 449.36 ha of agricultural land. An image showing the spatial distribution of the fires in the country is presented in Figure 74.

Table 33. Distribution of burned area (ha) in Bulgaria by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Agricultural Areas	449.36	28.74%
Forest/Other Wooded	594.92	38.05%
Other Natural Lands	519.40	33.22%
<b>Total:</b>	<b>1563.69</b>	<b>100.00%</b>



Figure 74. Forest fires in Bulgaria

### 2.2.7. Sweden

The area affected by 6 fires in Sweden during April and June was 741.98 ha, of which 52.15 ha occurred on Natura2000 land. These fires affected mainly forests and other wooded land (709.55 ha). The rest of the affected area consisted of other natural lands (30.79 ha) and other land covers (1.63 ha).

Table 34. Distribution of burned area (ha) in Sweden by land cover types

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded	709.55	95.63%
Other Natural Lands	30.79	4.15%
Other Land Cover	1.63	0.22%
<b>Total:</b>	<b>741.98</b>	<b>100.00%</b>

### 2.2.8. Albania

The total burnt area mapped in Albania measured from satellite imagery was 7 607.86 ha, which represented a significant decrease in areas affected by fires when compared to the 2007 and 2008 fire seasons (127 944 and 19 254 ha respectively). Table 35 presents the distribution of the mapped burned area by land cover type using the CLC 2000 database. 4 790.37 ha were burnt in forests and other wooded lands. The remaining burned area was distributed in other natural lands (2309.70 ha), agriculture (352.02 ha), artificial surfaces, i.e. urban, industrial or social areas (78.99 ha), and other land cover types (75.78 ha).

Figure 75 shows the burnt scars resulting from forest fires in the Albanian territory.

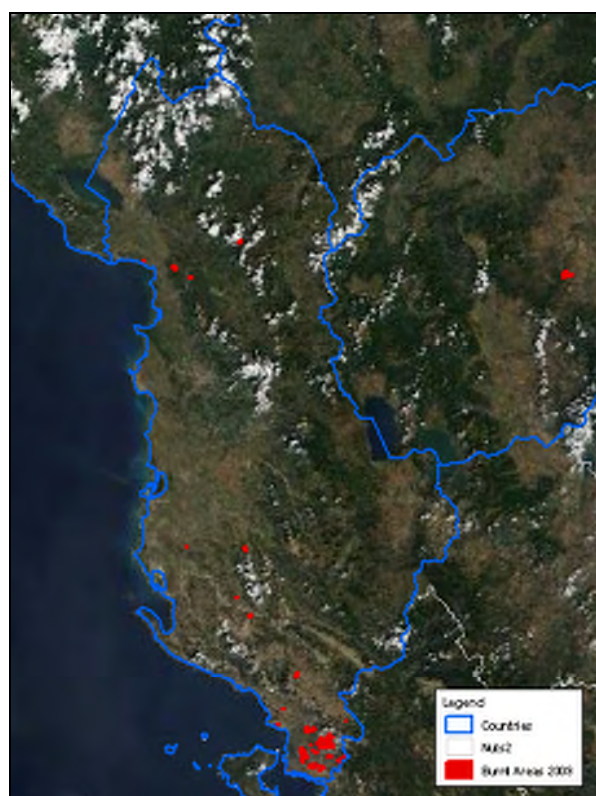


Figure 75. Forest fires in Albania

Table 35. Distribution of burned area (ha) in Albania by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Artificial Surfaces	78.99	1.04%
Agricultural Areas	352.02	4.63%
Forest/Other Wooded	4790.37	62.97%
Other Natural Lands	2309.70	30.36%
Other Land Cover	75.78	1.00%
<b>Total:</b>	<b>7606.86</b>	<b>100.00%</b>

### 2.2.9. Bosnia-Herzegovina

The 2009 fire season in Bosnia-Herzegovina was mild. The total burned area mapped in the country was 181.47 ha in a single fire in September. This total is significantly lower than either 2008 (6962 ha) or 2007 (56799 ha). Table 36 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 database. In terms of land cover, only 27.3 ha were burnt in forests and other wooded lands, while the rest (i.e. 154.16 ha) occurred in other natural lands.

Table 36. Distribution of burned area (ha) in Bosnia-Herzegovina by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Forest/Other Wooded	27.30	15.05%
Other Natural Lands	154.16	84.95%
<b>Total:</b>	<b>181.47</b>	<b>100.00%</b>

### 2.2.10. Croatia

The 2009 season was an average year for Croatia. The total area burned mapped in Croatia measured from satellite imagery was 2 208.32 ha, of which more than 1 000 ha came from a single fire in the last week of August.

Table 37 presents the distribution of the mapped burned area by land cover type using the CLC. In terms of land cover, from a total of 2 208.32 ha of burnt area mapped, 824.31 ha were forest and other wooded lands, 1 244.74 ha were agricultural areas, and 121.01 ha were other natural lands. Additionally, 18.27 ha were burnt in artificial areas, i.e. urban, industrial or social areas.

Visible fire scars caused by forest fires in Croatia can be observed in Figure 76.





Figure 76. Impact of forest fires in Croatia

Table 37. Distribution of burned area (ha) in Croatia by land cover types.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Artificial Surfaces	18.27	0.83%
Agricultural Areas	1244.74	56.37%
Forest/Other Wooded	824.31	37.33%
Other Natural Lands	121.01	5.48%
<b>Total:</b>	<b>2208.32</b>	<b>100.00%</b>

### 2.2.11. Former Yugoslav Republic of Macedonia (FYROM)

FYROM was much less affected by large forest fires in 2009 than in the last 2 years. The total burned area mapped in FYROM by the end of the fire season was 901.20 ha, from 2 fires in September. Table 38 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 901.20 ha of burnt area mapped, 434.0 ha were burnt in forests and other wooded lands, 239.68 ha were other natural lands, and 227.52 ha were in agricultural areas.

Table 38. Distribution of burned area (ha) by land cover types in FYROM.

<i>Land cover</i>	<i>Area burned</i>	<i>% of total</i>
Agricultural Areas	227.52	25.25%
Forest/Other	434.00	48.16%
Other Natural Lands	239.68	26.60%
<b>Total:</b>	<b>901.20</b>	<b>100.00%</b>

### 2.2.12. Montenegro

The burned area mapped in Montenegro was 103.25 ha from one fire in September, a considerable drop from the previous year's total (5 772 ha in 2008).

Table 39 presents the distribution of the mapped burnt area by land cover type using the CLC 2000 map. In terms of land cover, from a total of 103.25 ha of burnt area mapped, only 3.24 ha occurred in forest and other wooded lands. There was a small amount (2.39 ha) in agricultural areas, and the rest (97.62 ha) occurred in other natural areas.

Table 39. Distribution of burned area (ha) in Montenegro by land cover types.

<i>Land cover</i>	<i>Area</i>	<i>% of total</i>
Agricultural Areas	2.39	2.31%
Forest/Other Wooded	3.24	3.14%
Other Natural Lands	97.62	94.55%
<b>Total:</b>	<b>103.25</b>	<b>100.00%</b>

### 2.2.13. Turkey

Turkey was much less severely affected by large fires in 2009 than in 2008. The total burnt area mapped was 5 796.93 ha (compared with 27 848 ha in 2008). Since the CORINE Land Cover database has not been yet developed in Turkey, it is not possible to provide detailed statistics on the different land cover types that were affected by fires.

A view of the fires is given in Figure 77.



Figure 77. View of forest fires in Western Turkey

### 2.2.14. North Africa

Figure 78 shows the major burned areas in Morocco, Algeria and Tunisia during the 2009 fire season. A high number of fires of at least 50 ha in size were observed, in particular in Algeria where 141 925.13 ha were burnt, making it the country most severely affected by fires during 2009.

Practically all the large fires occurred in the months of July and August, with over 160 fires of

more than 50 ha recorded in July, burning over 110 000 ha that month, followed by another 70 fires in August.

The other African countries were also affected, although to a lesser extent. 2 111.86 ha were burnt in Morocco and 128.96 ha in Tunisia. Since the CORINE Land Cover database has not been yet developed in these countries, it is not possible to provide detailed statistics on the different land cover types that were affected by fires.

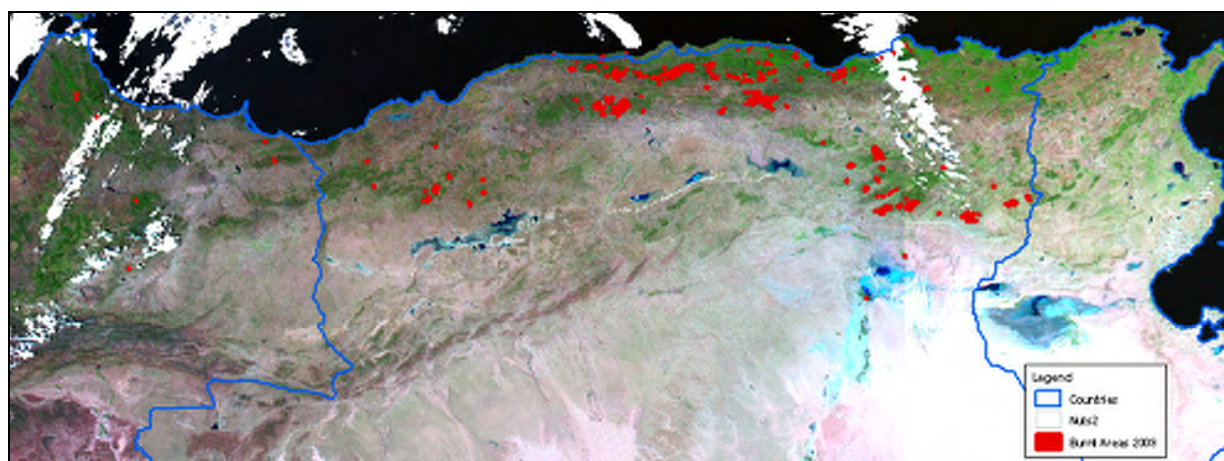


Figure 78: Impact of forest fires in Morocco, Algeria and Tunisia

## 2.3. EUROPEAN FIRE DATABASE

### *Background*

The European Fire Database is an important component of EFFIS containing forest fire information compiled by EU Member States and the other countries members of the EFFIS network.

The first steps to create a forest fire database were taken under the **Regulation EEC No 2158/92** (now expired), which set up an action framework focussing mainly on measures for the prevention of forest fires. Under the regulation, a first forest fire information system, referred to as the Common Core Database, was established in order to collect information on forest fires, their causes and to improve the understanding of forest fires and their prevention.

Detailed rules for the application of this forest fire information system were given in the subsequent **Regulation EEC No 804/94** which made the systematic collection of a minimum set of data on each fire event a matter of routine for the Member States participating in the system. The Common Core Database covered six Member States of the Union: Germany, Portugal, Spain, France, Italy and Greece. Regulation 2158/92 was renewed for five years in 1997 and expired on 31 December 2002.

The **Forest Focus Regulation (EC) No 2152/2003** was built on the achievements of the two previous Council Regulations on the protection of Community's forests against atmospheric pollution and forest fires. According to the implementing rules of the Regulation, monitoring of forest fires in Europe continued to be recorded in order to collect comparable information on forest fires at Community level.

The forest fire data provided each year by individual EU Member States through the above-mentioned EU regulations, and additional data coming from other European countries have been checked, stored and managed by JRC within EFFIS. The database is now known as the *European Fire Database*.

### *Structure and collected information*

The database contains four types of information: about the time, location, size and cause of the fire (Table 40).

Before being accepted into the database, the submitted data pass through a validation phase. The checks include the following:

#### Time of fire

Is the date valid?

Does the date given in the file match the year given in the filename?

Does the date/time of intervention/extinction occur after the initial date/time of alert?

Is the duration of the fire reasonable given its size?

#### Location of fire

Do the place names exist and are they correctly spelt?

Are the commune name/code/NUTS codes consistent with each other?

Is the correct (up to date) code used?

If information is missing, is it possible to obtain it from cross-referring other data?

If North/East values are given, are they plausible?

#### Size of fire

Are the values plausible (e.g. correct units)?

Have the categories (Forest, Non-forest, etc.) been assigned correctly?

#### Cause of fire

Is the mapping between the country cause code and EU code consistent/correct?

### *Data stored in the database*

The database now contains fire data from 21 countries: Bulgaria, Croatia, Cyprus, Czech, Estonia, Finland, France, Germany, Greece, Hungary, Italy, Latvia, Lithuania, Poland, Portugal, Romania, Slovakia, Spain, Sweden, Switzerland and Turkey, and comprises around 1.9 million individual fire event records (1.58 million forest fires). See Table 41 for a summary.

### *Access to the information*

Access to summarised information from the database is available through EFFIS web interface (<http://effis.jrc.ec.europa.eu/fire-history>), which allows the users to retrieve general information



such as maps of the number of fires, burnt area and average fire size for a selected year and for the countries for which data are available (Figure 79). The data can be displayed at country, NUTS1, NUTS2 or NUTS3 level and may be

filtered to exclude fires below a certain size, while an interactive graphical facility allows the user to display the same fire statistics over time. Further analysis possibilities are planned for the future.

Table 40. Information collected for each fire event

ID	Unique Fire identifier	FIREID
TIME OF FIRE	Date of first alert [YYYYMMDD]	DATEAL
	Time of first alert [HHMM]	TIMEAL
	Date of first intervention [YYYYMMDD]	DATEIN
	Time of first intervention [HHMM]	TIMEIN
	Date of fire extinction [YYYYMMDD]	DATEEX
	Time of fire extinction [HHMM]	TIMEEX
LOCATION OF FIRE	Province Code (national nomenclature)	PROVCODE
	NUTS3 code	NUTS3
	Commune Code (national nomenclature)	CODECOM
	Commune Name (national nomenclature)	NAMECOM
	Latitude [decimal degrees]	NORTH
	Longitude [decimal degrees]	EAST
SIZE OF FIRE (Ha)	Burned Area FOREST	BAFOR
	Burned Area OTHER WOODED LAND	BAOW
	Burned Area OTHER NON WOODED NATURAL LAND	BAONW
	Burned Area AGRICULTURE AND OTHER ARTIFICIAL LAND	BAAGR
CAUSE OF FIRE	Presumed Cause (EU categories code)	CAUSE_EU
	Presumed Cause (Country detailed categories code)	CAUSE_CO

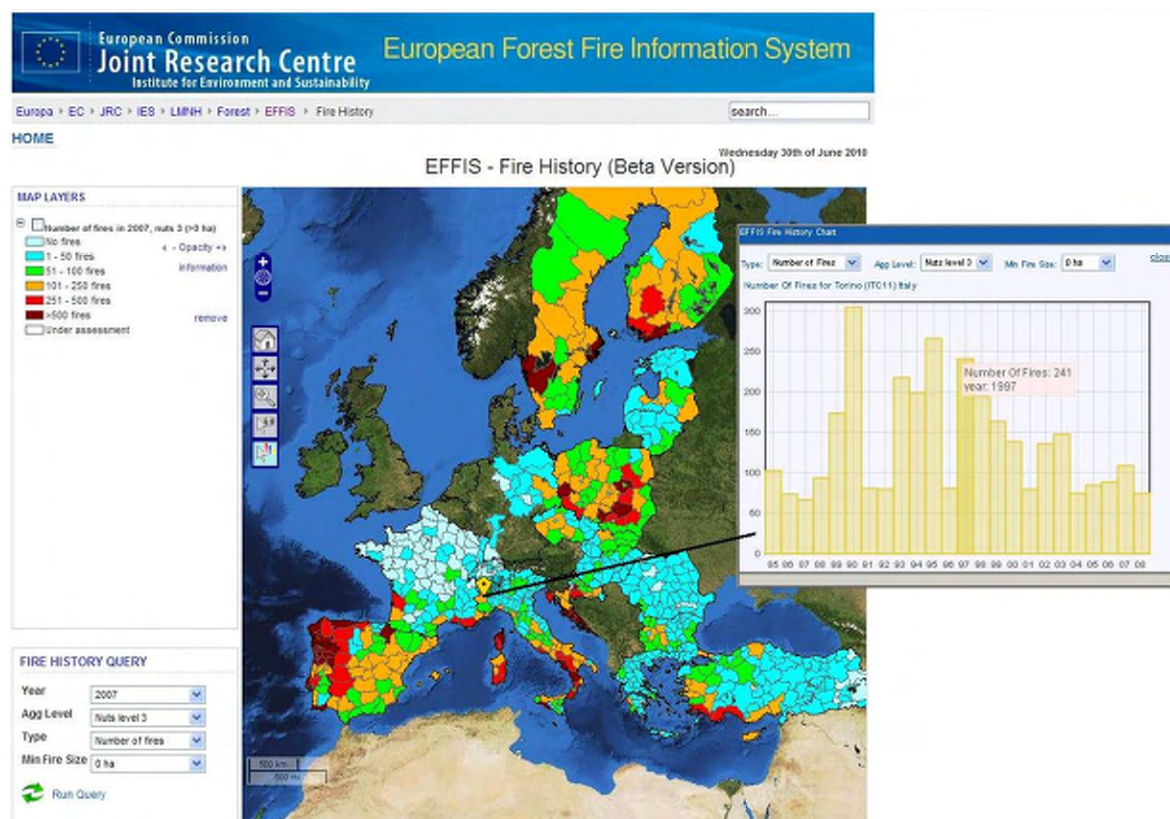


Figure 79. Access to the information stored in the European Fire Database from EFFIS web interface



Table 41. Summary of data records stored in the European Fire Database

COUNTRY	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	
Bulgaria																										251	393	1479	582	
Croatia																	3147	3795	5485	3856	7897	4045	4713	6937	2859	3372	3581	5176		
Cyprus																					285	299	243	427	221	185	172	111	114	
Czech rep.																									957	653	697	809	470	
Estonia																										65	248	64	71	
Finland																										2216*	2631*	6314*	2813*	3161*
France						3732	2657	2116	2240	3321	3297	2372	2708	4766	4728	6539	6401	8001	6289	4881	4343	4259	4097	7023	3767	4698	4608	3382	2781	
Germany															706	525	822	276	592	794	930	373	278	1238	300	299	717	435	560	
Greece				945	1184	1417	1088	1234	1798	1203	1283	1036	2008	2707	1955	1494	1527	2271	605	513	1469	1313	572	622	739	718	764	1226		
Hungary																							429	373	104	150	97	603	502	
Italy						12931	6115	8506	9785	8328	11560	7580	10044	14317	7153	5505	6064	11608	9565	6956	8609	7227	4607	9717	6340	7919	5653	10736	6648	
Latvia																									647	365	1929	426	716	
Lithuania																									430	267	1444	245	272	
Poland															24365	23822	23587	25070	21348	32650	31811	24513	38154	79018	36320	46546	35634	31311	35804	
Portugal	2349	6730	3626	4542	7356	8441	5036	7705	6131	21896	10745	14327	14954	16101	19983	34116	28626	23497	34676	25477	34109	26942	26498	26195	21952	35699	19929	19024	13836	
Romania																									34	64	105	478	91	
Slovakia																									153	287	238	463	182	
Spain						12235	7514	8816	9440	20250	12914	13529	15956	14253	19249	25557	16586	22320	22003	17943	23574	19099	19929	18616	21396	25492	16334	10932	11656	
Sweden																	4854	7057	2503	4707	4708	4831	6490	8282	4955	4573	4618	3787	5420	
Switzerland	79	147	71	107	166	96	76	109	76	168	235	148	70	76	74	87	108	135	91	45	49	48	67	155	49	63	46	65	46	
Turkey																										1530	2227	2706	2135	

2009 data are still undergoing validation checks and are not presented

\* Data undergoing further validation – final count may change

**NB.** The totals given in this table do not always match the published number of fires for a number of reasons:

1. Purely agricultural fires are stored in the database if submitted by the country, but are excluded from forest fire calculations
2. Some countries do not report detailed records for the whole of their territory and this information is only available in summary form

**BACKGROUND DOCUMENTATION**

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**ANNEX I – SUMMARY TABLES OF FIRE STATISTICS**

Table 42. Number of forest fires in five Southern Member States (1980-2009)

Table 43. Burnt area (hectares) in five Southern Member States (1980 – 2009)

Table 44. Number of forest fires in other European countries (1990-2009)

Table 45. Burnt area (hectares) in other European countries (1990 – 2009)

**NOTE**

Every effort is made to ensure that the published figures are correct. However, at the time of printing some data are provisional and may be changed in the future. Where there is a discrepancy between figures published in different reports, the later report should be taken as the definitive version.

**Table 42. Number of forest fires in five Southern Member States (1980-2009)**

<i>Year</i>	<i>PORTUGAL</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>GREECE</i>	<i>TOTAL</i>
1980	2 349	7 190	5 040	11 963	1 207	27 749
1981	6 730	10 878	5 173	14 503	1 159	38 443
1982	3 626	6 545	5 308	9 557	1 045	26 081
1983	4 539	4 791	4 659	7 956	968	22 913
1984	7 356	7 203	5 672	8 482	1 284	29 997
1985	8 441	12 238	6 249	18 664	1 442	47 034
1986	5 036	7 570	4 353	9 398	1 082	27 439
1987	7 705	8 679	3 043	11 972	1 266	32 665
1988	6 131	9 247	2 837	13 588	1 898	33 701
1989	21 896	20 811	6 763	9 669	1 284	60 423
1990	10 745	12 913	5 881	14 477	1 322	45 338
1991	14 327	13 531	3 888	11 965	858	44 569
1992	14 954	15 955	4 002	14 641	2 582	52 134
1993	16 101	14 254	4 769	14 412	2 406	51 942
1994	19 983	19 263	4 618	11 588	1 763	57 215
1995	34 116	25 827	6 563	7 378	1 438	75 322
1996	28 626	16 771	6 401	9 093	1 508	62 399
1997	23 497	22 320	8 005	11 612	2 273	67 707
1998	34 676	22 446	6 289	9 540	1 842	74 793
1999	25 477	18 237	4 960	6 932	1 486	57 092
2000	34 109	24 118	4 603	8 595	2 581	74 006
2001	26 533	19 547	4 309	7 134	2 535	60 058
2002	26 488	19 929	4 097	4 601	1 141	56 256
2003	26 195	18 616	7 023	9 697	1 452	62 983
2004	21 870	21 394	3 775	6 428	1 748	55 215
2005	35 697	25 492	4 698	7 951	1 544	75 382
2006	19 929	16 355	4 608	5 634	1 417	47 943
2007	18 722	10 915	3 364	10 639	1 983	45 623
2008	13 832	11 612	2 781	6 486	1 481	36 192
2009	26 119	15 391	4 800	5 422	1 063*	52 795
<i>% of total in 2009</i>	49%	29%	9%	10%	2%	100%
<i>Average 1980-1989</i>	7 381	9 515	4 910	11 575	1 264	34 645
<i>Average 1990-1999</i>	22 250	18 152	5 538	11 164	1 748	58 851
<i>Average 2000-2009</i>	24 949	18 337	4 951	7 259	1 695	56 645
<i>Average 1980-2009</i>	18 194	15 335	4 951	9 999	1 569	50 047
<i>TOTAL</i>	545 805	452 848	148 531	299 977	47 058	1 501 409

\* Provisional data, total likely to rise

**Table 43. Burnt area (hectares) in five Southern Member States (1980 – 2009)**

<i>Year</i>	<i>PORTUGAL</i>	<i>SPAIN</i>	<i>FRANCE</i>	<i>ITALY</i>	<i>GREECE</i>	<i>TOTAL</i>
1980	44 251	263 017	22 176	143 919	32 965	506 328
1981	89 798	298 288	27 711	229 850	81 417	727 064
1982	39 556	152 903	55 145	130 456	27 372	405 432
1983	47 811	108 100	53 729	212 678	19 613	441 931
1984	52 710	165 119	27 202	75 272	33 655	353 958
1985	146 254	484 476	57 368	190 640	105 450	984 188
1986	89 522	264 887	51 860	86 420	24 514	517 203
1987	76 269	146 662	14 108	120 697	46 315	404 051
1988	22 434	137 734	6 701	186 405	110 501	463 775
1989	126 237	426 693	75 566	95 161	42 363	766 020
1990	137 252	203 032	72 625	195 319	38 594	646 822
1991	182 486	260 318	10 130	99 860	13 046	565 840
1992	57 011	105 277	16 593	105 692	71 410	355 983
1993	49 963	89 267	16 698	203 749	54 049	413 726
1994	77 323	437 635	24 995	136 334	57 908	734 195
1995	169 612	143 484	18 137	48 884	27 202	407 319
1996	88 867	59 814	11 400	57 988	25 310	243 379
1997	30 535	98 503	21 581	111 230	52 373	314 222
1998	158 369	133 643	19 282	155 553	92 901	559 748
1999	70 613	82 217	15 906	71 117	8 289	248 142
2000	159 605	188 586	24 078	114 648	145 033	631 950
2001	111 850	93 297	20 642	76 427	18 221	320 437
2002	124 411	107 464	30 160	40 791	6 013	308 839
2003	425 726	148 172	73 278	91 805	3 517	742 498
2004	129 539	134 193	13 711	60 176	10 267	347 886
2005	338 262	188 697	22 135	47 575	6 437	603 106
2006	75 510	148 827	7 844	39 946	12 661	284 788
2007	31 450	82 048	8 570	227 729	225 734	575 531
2008	17 244	50 321 <sup>†</sup>	6 001	66 329	29 152	158 621
2009	87 416	110 783	17 000	73 355	35 342 <sup>‡</sup>	323 896
<i>% of total in 2009</i>	27%	34%	5%	23%	11%	100%
<i>Average 1980-1989</i>	73 484	244 788	39 157	147 150	52 417	556 995
<i>Average 1990-1999</i>	102 203	161 319	22 735	118 573	44 108	448 938
<i>Average 2000-2009</i>	150 101	125 239	22 342	83 878	49 238	430 798
<i>Average 1980-2009</i>	108 596	177 115	28 078	116 534	48 587	478 910
<i>TOTAL</i>	3 257 886	5 317 457	842 332	3 496 005	1 457 624	14 367 304

<sup>†</sup> Updated since last year<sup>‡</sup> Provisional data

**Table 44. Number of forest fires in other European countries (1990-2009)**

<i>Country</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>
<i>Austria</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	954*	912*	750*	-	218
<i>Bulgaria</i>		73	602	1196	667	114	246	200	578	320	1710	825	402	452	294	241	393	1479	582	314
<i>Croatia</i>	-	-	-	-	-	-	-	-	-	-	7797	4024	4692	6923	2853	3368	3571	5176	-	-
<i>Cyprus</i>	-	-	-	-	-	-	-	-	-	-	285	299	243	427	221	185	172	111	114	91
<i>Czech Rep.</i>	-	-	-	-	-	1331	1421	1398	2563	1402	1499	483	604	1754	873	619	697	-	-	-
<i>Estonia</i>	-	-	-	-	-	-	-	-	-	-	-	-	356	111	89	65	248	64	71	47
<i>Finland</i>	-	-	-	-	-	-	1475	1585	370	1528	806	796	2489	1707	783	1069	3046	1204	1415	1004
<i>FYROM</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	652	573	80
<i>Germany</i>	-	1846	3012	1694	1696	1237	1748	1467	1032	1178	1210	587	513	2524	626	496	930	779	818	858
<i>Hungary</i>	-	-	-	-	-	-	-	-	-	229	811	419	382	375	104	150	97	603	502	-
<i>Latvia</i>	604	225	1510	965	763	582	1095	768	357	1196	915	272	1720	900	647	365	1929	425	700	823
<i>Lithuania</i>	-	-	1180	634	715	472	894	565	258	1022	654	287	1596	885	468	301	1545	251	301	471
<i>Poland</i>	5756	3528	11858	8821	10710	7681	7924	6818	6166	9820	12428	4480	10101	17088	7219	12803	11828	8305	9091	9161
<i>Romania</i>	131	42	187	159	121	62	72	37	59	138	688	268	516	203	34	64	105	478	91	190
<i>Slovakia</i>	-	-	-	-	366	254	662	535	1056	426	824	311	570	872	153	287	237	463	182	347
<i>Slovenia</i>	-	-	-	-	-	-	-	-	-	-	-	-	60	224	51	73	112	140	74	120
<i>Sweden</i>	-	-	-	-	-	-	4854	7057	2503	4707	4708	4831	6490	8282	4955	4573	4618	3737	5420	4180
<i>Switzerland</i>	235	148	70	76	74	87	108	135	91	45	49	48	67	154	49	63	46	39	46	52
<i>Turkey</i>	-	-	-	-	-	-	-	-	1932	2075	2353	2631	1471	2177	1762	1530	2227	2829	2135	1793

\* Database undergoing validation – figures may change in future



**Table 45. Burnt area (hectares) in other European countries (1990 – 2009)**

<i>Country</i>	<i>1990</i>	<i>1991</i>	<i>1992</i>	<i>1993</i>	<i>1994</i>	<i>1995</i>	<i>1996</i>	<i>1997</i>	<i>1998</i>	<i>1999</i>	<i>2000</i>	<i>2001</i>	<i>2002</i>	<i>2003</i>	<i>2004</i>	<i>2005</i>	<i>2006</i>	<i>2007</i>	<i>2008</i>	<i>2009</i>
<i>Austria</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	74*	75*	48*	-	22
<i>Bulgaria</i>	-	511	5243	18164	18100	550	906	595	6967	8291	57406	20152	6513	5000	1137	1456	3540	42999	5289	2271
<i>Croatia</i>	-	-	-	-	-	-	-	-	-	-	129883	27251	74945	77359	8988	21407	18782	63719	-	-
<i>Cyprus</i>	-	-	-	-	-	-	-	-	-	-	8034	4830	2196	2349	1218	1838	1160	4483	2392	885
<i>Czech Rep.</i>	-	-	-	-	-	403	2043	359	1132	336	375	87	178	1236	335	227	53	-	-	-
<i>Estonia</i>	-	-	-	-	-	-	-	-	-	-	-	-	2082	207	379	87	2638	292	1280	59
<i>Finland</i>	-	-	-	-	-	-	433	1146	131	609	262	174	584	664	351	495	1617	576	824	595
<i>FYROM</i>	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	32665	5915	1307
<i>Germany</i>	-	920	4908	1493	1114	592	1381	599	397	415	581	122	122	1315	274	183	482	256	538	757
<i>Hungary</i>	-	-	-	-	-	-	-	-	-	756	1595	-	1227	845	247	3531	625	4636	2404	-
<i>Latvia</i>	258	69	8412	570	326	535	927	448	211	1544	1341	311	2222	559	486	120	3387	272	364	646
<i>Lithuania</i>	-	-	769	274	279	321	478	226	93	494	352	113	746	436	253	51	1199	38	112	287
<i>Poland</i>	7341	2567	43755	8290	9171	5306	14120	6598	4019	8307	7013	3429	5593	28554	4338	7387	5912	2844	3028	4400
<i>Romania</i>	444	277	729	518	312	208	227	68	137	379	3607	1001	3536	762	124	162	946	2529	373	974
<i>Slovakia</i>	-	-	-	-	-	-	-	-	-	557	904	305	595	1567	157	524	280	679	118	510
<i>Slovenia</i>	-	-	-	-	-	-	-	-	-	-	-	-	161	2100	138	280	1420	128	75	177
<i>Sweden</i>	-	-	-	-	-	-	1588	5873	422	1771	1552	1254	2626	4002	1883	1562	5710	1090	4280	860
<i>Switzerland</i>	1705	96	27	34	404	444	286	1685	261	30	68	17	697	640	23	41	108	282	65	43
<i>Turkey</i>	-	-	-	-	-	-	-	-	6764	5804	26353	7394	8513	6644	4876	2821	7762	11664	23577	4679

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\* Database undergoing validation – figures may change in future



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**Abstract**

This is the 10<sup>th</sup> “Forest Fires in Europe” report published by the European Commission. The report contains a summary of the 2009 fire season in Europe, with official statistics on number of fires and burned areas compiled by the contributing countries. In addition to country reports with a summary of the past fire season provided by the countries, the report Forest Fires in Europe informs about the latest developments in terms of forest fire prevention and initiatives of the European Commission to support forest fires fire protection activities in the European Union. Furthermore it provides the results of the European Forest Fire Information System (EFFIS) operating during the fire season, with special emphasis on the EFFIS Danger Forecast, providing daily maps of meteorological fire danger forecast of EU, and the EFFIS Rapid Damage Assessment, performing the daily mapping and assessment of main land cover and Natura2000 areas affected by fires of at least 40 ha during the fire season.

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